THE Journal

OF THE AMERICAN DENTAL ASSOCIATION

JANUARY

1958

This issue contains selected articles from

the British Commonwealth, Scandinavia, the Middle East, Mexico and Hungary

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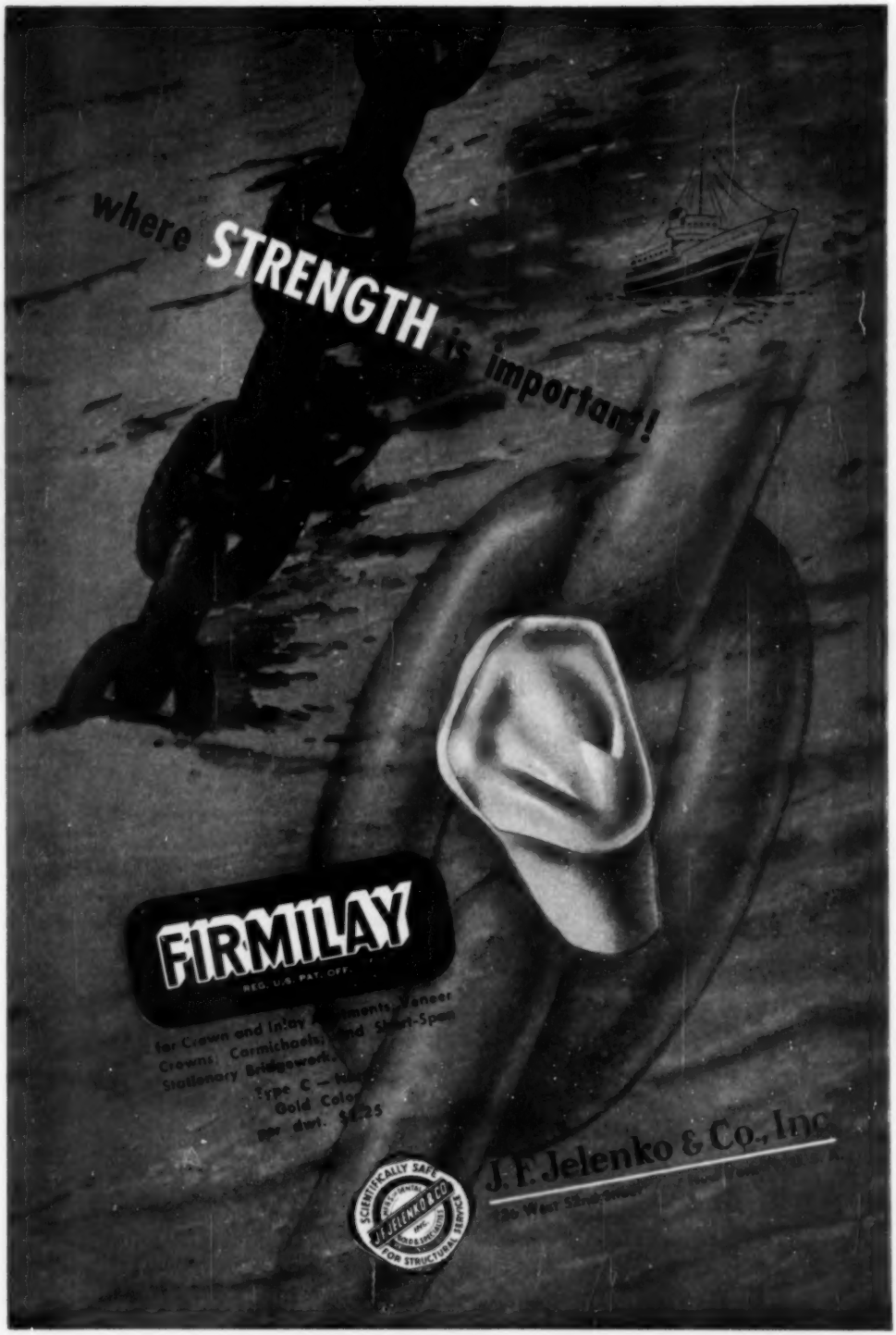
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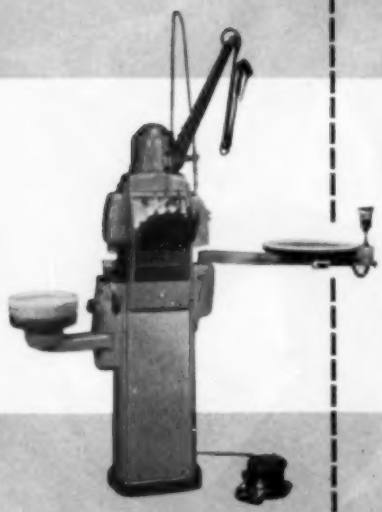

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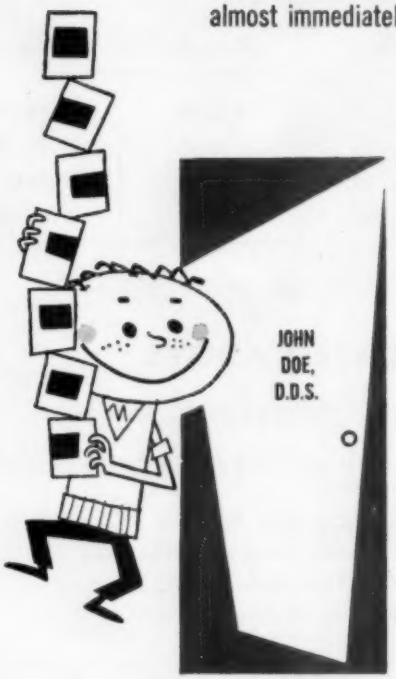

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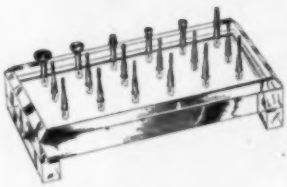

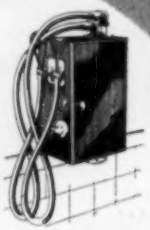

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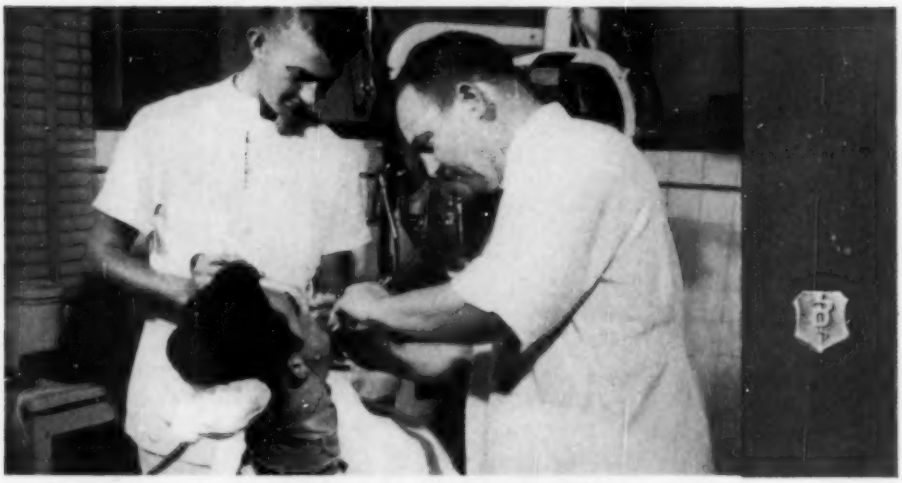

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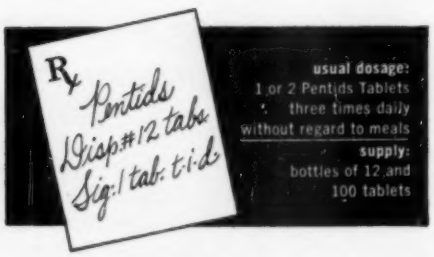

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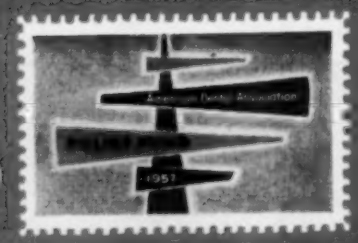

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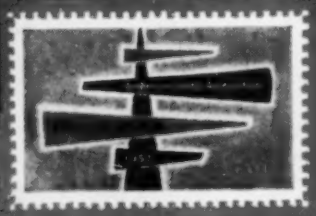

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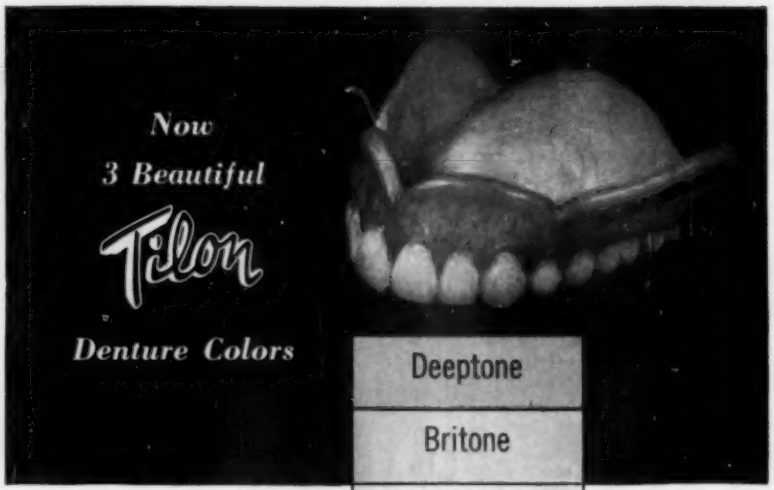

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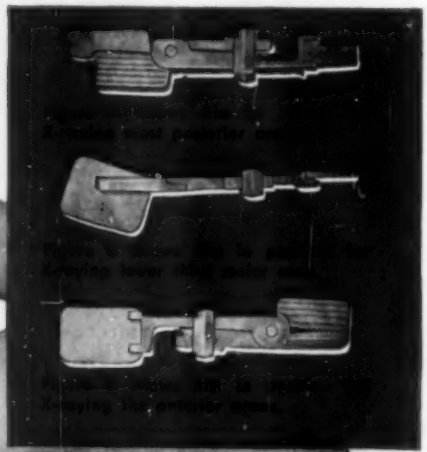

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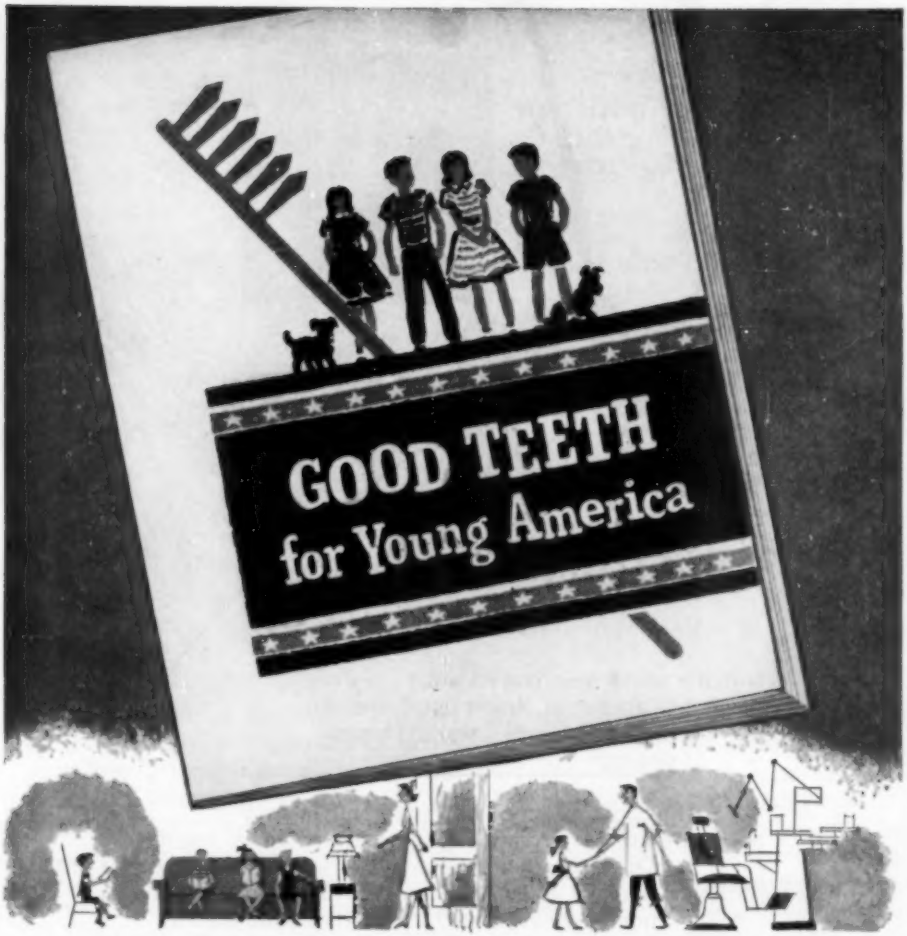

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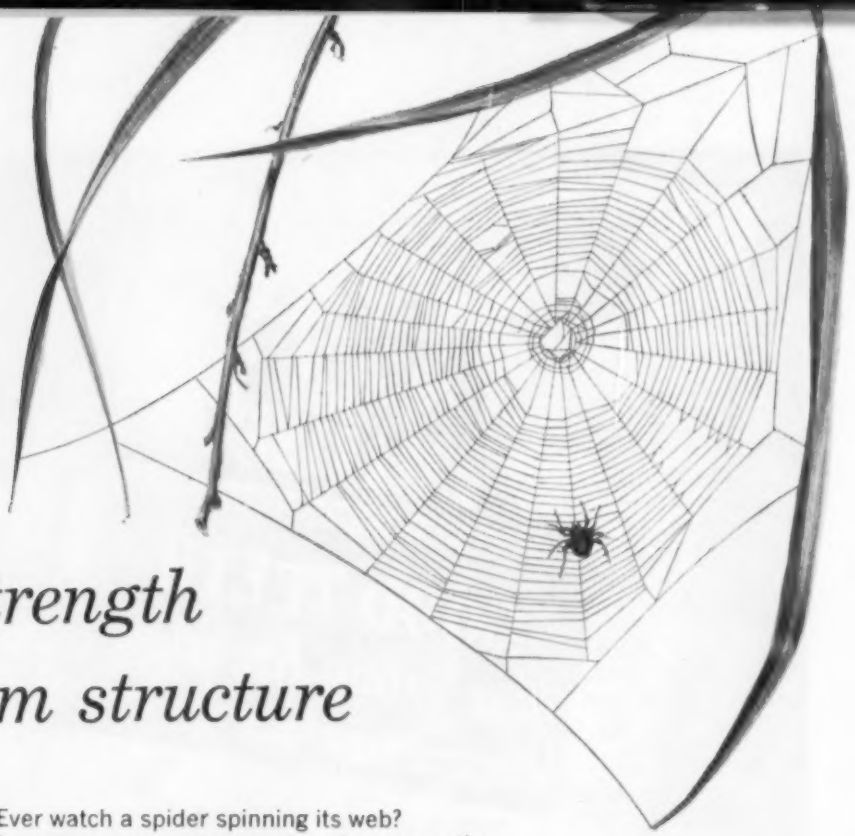

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Multiple ossifying periapical fibroma diagnosis and surgery

Ayoub Amer, B.Ch.D. (Egypt), D.D.S., M.Sc.D., Cairo, Egypt

There has been so much said about fibrous dysplasias, and many classifications have been presented in the recent literature.[1-6] A comprehensive review of the literature shows that many names, such as central osteoma, enostosis, exostosis, fibrous dysplasia, fibro-osseous dysplasia, osteofibroma, fibro-osteoma, osteitis fibrosa, localized osteitis fibrosa, localized osteitis, ossifying fibroma and ossifying periapical fibroma, have been given to this particular lesion. On the basis of clinical and roentgenographic studies, as well as open view examination, that were made after surgical exposure of such conditions, it was decided that the term "ossifying periapical fibroma" is the most appropriate for the description of these lesions as they occur within the jaws.

ETIOLOGY

There is also considerable controversy concerning the causes and origin of these lesions. Stafne[4] and Zegarelli and Ziskin[2] ruled out the connection between such lesions and systemic diseases, such as hyperparathyroidism and syphilis, active presently or in the past. Trauma to the teeth involved has been eliminated as a local cause in the instances reported by Zegarelli and Ziskin,[2] Ennis and Berry[6] and other investigators, and related teeth have been found to be vital.

Geschickter and Copeland[7] have considered that such lesions arise in the subperiosteum, whereas Ennis and Berry[6]

Presented at the Middle East Dental Congress, Cairo, Egypt, March 17, 1957.

Lecturer and chairman of the department of oral surgery and roentgenology, School of Dental Surgery, Fouad I University.

1. Stafne, E. C. Periapical osteofibrosis with formation of cementome. J.A.D.A. 21:1822 Oct. 1934.

2. Zegarelli, E. V., and Ziskin, D. E. Cementomas. A report of 50 cases. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 30:285 May 1943.

3. Sorrin, Sidney. Ten-year study of a case of osteofibrosis. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 30:329 June 1944.

4. Stafne, E. C. Periapical fibroma: roentgenologic observations. J.A.D.A. 30:688 May 1943.

5. Thoma, Kurt H. Oral pathology, a histological, roentgenological, and clinical study. St. Louis, C. V. Mosby Co., 1941, p. 955-957.

6. Ennis, L. M., and Berry, H. M., Jr. Ossifying periapical fibroma: roentgenologic studies. J.A.D.A. 37:642 Dec. 1948.

7. Geschickter, Charles F., and Copeland, M. M. Tumors of bone (including the jaws and joints). New York, American Journal of Cancer, 1936.

have stated that they arise from the apical region of the periapical bone. On the other hand, Phemister and Grimson[8] as well as other writers consider that these lesions originate in the spongiosa.

CLINICAL FEATURES

This tumor has been reported to occur in persons under 30 years of age.[9] In other studies, it is mentioned that a greater number of the patients in whom this condition was discovered have been between the ages of 35 and 50 years, although the condition has been found in patients ranging in age from 22 to 65 years.[6]

Stafne[1] found that 70 per cent of his patients with ossifying periapical fibroma were females, whereas the group examined by Zegarelli and Ziskin[2] were all females.

In the majority of reported instances of the disease in the mandible, the condition was not noticed by the patient because of the absence of clinical symptoms. The lesions were discovered only in roentgenograms and appeared as radiolucent periapical areas, solitary or multiple, with regeneration of bone or cementum after clinical observation for a period of years. These lesions chiefly involved the mandibular incisors, cuspids and occasionally the bicuspids as stated by Ennis and Berry[6] in their study of these conditions. Other authors state that the body of the mandible is the usual site.[9]

In the instances reported in the literature in which the lesions occurred in the maxilla, the condition was discovered by the patient when there was a noticeable enlargement due to intraoral deformity disturbing the facial contour.[9-11] Thus, the most characteristic clinical feature of these lesions, particularly of those affecting the maxilla, has been their increase in size until the deformity becomes obvious to the patient or his relatives. Discovery may always take place in this way if the patient has not discovered the condition because of the resulting pain or discomfort. It is worth while to mention in this discussion that, although these benign growths are painless, in certain instances the condition definitely is accompanied by pain that makes the patient seek treatment. This has been found to occur after the lesions have progressed and increased in size. As will be discussed later in connection with Figures 2 and 3, left, it is the presence of the mass or masses within the spongiosa and the growth of these lesions between the roots and apically which cause a varying amount of separation and deviation of the roots. This consequent displacement of the roots of related teeth and the tilting of their crowns initiates occlusal trauma. Thus, this factor may be responsible for evoking the patient's possible complaints of pain and vague neuralgias. Thus, these benign tumors, though in themselves generally symptomless, indirectly may produce either deformity or pain or both. This is true particularly when there are multiple lesions within a limited portion of the jaw, and it is in this way that they express their existence and their growth. It is rather difficult to determine the duration of these lesions because the tumor grows slowly, and, if the condition becomes noticeable, the history given by the patient is often unreliable. Signs or symptoms of inflammatory conditions have not been reported with this disease.

ROENTGENOGRAPHIC STUDIES

The roentgenographic findings in instances of ossifying periapical fibromas

8. Phemister, D. B., and Grimson, K. S. Fibrous osteoma of jaws. Ann. Surg. 105:564 April 1937.

9. Stoney, Hubert H. Oral and dental diseases: aetiology, histopathology, clinical features, and treatment. Edinburgh, E. & S. Livingstone, Ltd., 1948, p. 805-806.

10. Hara, H. J. Ossifying fibroma of superior maxilla. Arch. Otolaryng. 40:180 Sept. 1944.

11. Bernier, J. L. The management of oral diseases. St. Louis, C. V. Mosby Co., 1955, p. 650-651.

encountered and described by various authors in the literature have been variable. There has also been variation in the terms used to describe the roentgenographic appearance of the bone affected by these lesions. When the findings are disclosed by routine roentgenographic examination, especially in the mandible, they are usually single or multiple radiolucent areas at the apex of one or more teeth. These radiolucent areas as described by Stafne[4] and Ennis and Berry[6] have the appearance of being granulomas and small radicular cysts in the roentgenograms. Such findings in the roentgenograms would confuse the clinician, especially if evidence of suppurative processes is absent and if the tooth or teeth related are proved to be vital. Followup of these lesions, without any surgical intervention, and by taking series of roentgenograms over a period of years, has shown that the roentgenographic appearance of the lesions may be the same as when they were first discovered, with no changes in their shadows. Yet, some lesions have been found to give, after varying periods, a different roentgenographic picture, one in which there is radiopacity within the previously radiolucent area or areas. Thus, a dark area appears around the centrally located radiopaque calcification and surrounding this darker area is another white area representing condensed bone. This latter finding was misinterpreted in the past as indicating a calcified granuloma. In another phase of the development of these lesions, radiopacity is seen in the roentgenograms, showing that the calcification is complete, but there is still a thin, dark area around it, indicating the soft part of the growth. It is deduced from the roentgenographic findings discussed that the tumor itself is not uniform in all stages of its development.

On the other hand, the jawbone affected with these lesions has been described by Worth[12] as having a stippled appearance. Hara[10] has classified ossifying fibroma according to the roentgenographic appearance into two distinct types, circumscribed or diffuse. When the maxilla is noticeably enlarged, the cortex is thinned. Hara states that the roentgenographic appearance depends on the development in addition to the amount of calcification of the tumor and that the tumor appears roentgenographically to vary from diffuse haziness to complete ashy density. Stones[9] described the roentgenographic appearance of the condition as resembling cotton wool when it occurs in the maxilla, but he mentioned that in the mandible the appearance varies with the histological picture.

Stafne[1] also has classified the stages of development of these lesions after their original formation as fibrous masses and has concluded that they follow one of three courses, with consequent variations in their roentgenographic appearance:

(1) most of the fibroma may be converted to cementum, (2) the lesion may remain as a fibroma or cementoblastoma for an indefinite period, or (3) it may be completely replaced by bone.

Thoma[5] discusses the roentgenographic appearance according to three stages, the first of which is the "osteolytic stage" in which the immature cementoma is composed of cellular tissue containing no calcium and appears as a dark area. In the second stage, called the "cementoblastic stage," the cementum begins to form and this stage is characterized by the beginning of the deposition of calcium in the tumor which appears in the roentgenogram within the dark shadow of the original tumor. The third stage according to Thoma is the "mature inactive stage," when the calcification comes to an end. The calcified structure is surrounded by a thin dark area.

In addition to the aforementioned stages of roentgenographic appearance

12. Worth, H. M. Tumours of jaws. Brit. J. Radiol. 10:223 March 1937.

designated by various investigators, another stage will be presented in this discussion. It is the stage peculiar to lesions which do not stay stationary but express their activity by the increase of their size or number within the region occupied by them in the spongiosa—this is the stage in which they express their activity by growth with calcification. The calcification may be incomplete in some areas of the lesion and may be complete in other areas. Thus, the amount of radiopacity varies within the roentgenograms of the same lesions. These are found to be the conditions which cause disturbance of the facial contour. In such conditions, roentgenographic appearances have been found to show combination of the various phases of development within the same roentgenograms of the same lesions, as shown in Figures 2, 3, left, and 5 which will be discussed later. This stage may be called the "immature active stage with calcification."

In this stage, there are areas of rarefaction periapically as well as areas of deposition of bone (Fig. 2). Besides, there is a lobulation, giving multilocular appearance similar to that seen in other types of fibrous dysplasia. Occlusal views would be of great help in addition to the periapical views in revealing the condition more clearly from various angulations. A stippled appearance of the bone may be demonstrated (Fig. 3). Amounts of radiopacity are found to be variable and dispersed in various parts of the roentgenographic field. This roentgenographic picture of the bone with multiple lesions gives the lesions the appearance sometimes described as "ashy density" or "cotton wool."

Interpretation of these roentgenographic findings goes hand in hand with the open-view diagnosis of such lesions (Fig. 4). Lobules of various sizes and shapes existing within the jawbone and expanding the outer cortex cause the thinned out appearance of the cortical plate and the punched out appearance of the spongiosa as seen in the roentgenograms. Actually, the multiple small rounded areas which simulate small cystic areas are the newly formed bony compartments containing the fibrous masses of the tumor. These rounded areas are incomplete in themselves, but changed densities and superimposition of the structures in the new roentgenographic picture of the bone give these appearances.

HISTOPATHOLOGY

The microscopic picture of ossifying periapical fibroma varies greatly according to the stage of development. As described by Stafne[4] and others, the stroma is made up of young fibroblasts and collagen fibers, and few blood vessels are seen. Cementicles may form gradually in the periodontal membrane, may increase in number and size and may fuse into a solid mass. Bernier[11] mentioned that certain lesions exhibit a matrix of loose, embryonic fibrous tissue of osteoid character in which new thin trabeculae are noted and that spicules are outlined by osteoblasts. Vascularity is found to decrease with time, and the fibrous tissue may undergo some changes in the way of becoming more collagenous, and trabeculae of bone may become much larger.

In multiple ossifying periapical fibroma, the aforementioned features, especially the proportion of fibrous tissue and bone, are found to vary in microscopic fields of different regions of the same lesion. To a great extent, this seems to be in accord with the roentgenographic picture of the tumor masses proper when they are examined roentgenographically outside their original location as shown in Figure 5.

TREATMENT

In instances of solitary or multiple lesions in which there is no discomfort or disturbance of the facial contour, and, in the absence of clinical symptoms and signs of infection, surgical intervention

should be avoided. Clinical observation of such conditions over periods of years would be of great interest.

Surgical intervention may be indicated in those instances in which the tumor causes noticeable deformity or discomfort to the patient. Even then the treatment by surgical measures should be in a conservative manner, mainly with the purpose of correcting the deformity. To ensure proper surgical management of patients with conditions which have been puzzling to the surgeon and pathologists, adequate preoperative information, including aspiration biopsy, to exclude conditions simulating these lesions is essential. Various views of the lesions and study of their relation to neighboring vital structures would reveal the steps necessary to ensure the success of the surgical procedure. Unnecessary removal of related teeth is to be avoided. Total removal of small lesions occupying limited portions of the jaws is usually enough to reduce the bulk and restore facial contour. On the other hand, reasonable overextension of the excision, with moderate irradiation, is thought to be the method of choice. Phemister and Grimson[8] recommended a total of 3,000 r, given in several small doses with long periods between treatments.

REPORT OF A CASE

The following report of a case of multiple ossifying periapical fibroma of the jaw is of special interest because it gives an example of the "immature active stage with calcification" and because it illustrates the correlation of roentgenographic and histopathological studies with the clinical and open-view observations.

The patient was a 23 year old, Egyptian man who was a soldier and was well developed and well nourished. He was first seen in April 1955, and his chief complaint was mild pain during mastication and painless swelling of the right side of the face of six months' duration (Fig. 1).

Fig. 1 • Obvious distortion of facial contour caused by hard swelling in right maxilla

The patient had first sought treatment a few months previously, and he had been advised to have the teeth related to the swelling extracted, but he had refused. Then, the patient had been referred for treatment to the oral surgery department of the School of Dental Surgery from the outpatient department with a diagnosis of osteoma of the right maxilla.

Preoperative information revealed that the patient had not noticed the swelling's increasing much since he had first noticed the deformity. In addition, during questioning to ascertain any history of trauma, he remembered receiving a blow on the right side of the face but with no consequent bleeding, injury or swelling.

Clinical Examination • Intraoral examination revealed a more or less circumscribed unilateral swelling in the right side of the maxilla. The expansion extended from the cuspid distally to the second molar. It reached upward almost to the infraorbital ridge. Neither the tuberosity nor the palate were involved. On palpation, the swelling was found to be hard and was not tender when digital pressure was applied, and no fluctuation was noted. The color of the mucosa covering the lesion was normal, and there were no irregularities or ulcerations. There were no teeth missing from the arch, and

Fig. 2 • Roentgenograms revealing rarefaction periapically, as well as regions of bone deposition and wide separation of roots of bicuspids

the occlusion was almost normal, with the exception that the upper right bicuspids and first molar were not in proper occlusion with the corresponding lower teeth. There was no tenderness on percussion or decay of the teeth close to the swelling, and these teeth were not discolored and proved to be vital, with complete absence of any signs which would indicate inflammation.

There was no bleeding or nasal obstruction and no evidence of submaxillary or cervical adenopathy. The skin was found to be normal, and there was no evidence of pigmentation. The patient had a history of schistosomiasis which had been treated eight years previously. There was no evidence of tuberculosis, syphilis or hyperparathyroidism. Laboratory studies on bleeding and coagulation time and urinalysis showed findings within the normal.

Roentgenographic Examination • On roentgenographic examination, wide separation of the roots of the upper two bicuspids and tilting of both crowns were noted, with loss of contact points and areas of rarefaction as well as areas of radiopacity between the roots and in the periapical areas and the spongiosa above. The cotton wool appearance was clear in the periapical views (Fig. 2). The occlusal views revealed lobulation with multilocular appearance similar to that of small cystic cavities combined as seen in fibrous dysplasias (Fig. 3, left and right). The angulation in Figure 3, right, was used in an attempt to separate the most bulging part of the growth from the body of the jaw and to avoid superimpositions as much as possible. There was also a clear punched out appearance adjacent to the periapical areas of the bicuspids in the occlusal view (Figure 3, left). It was revealed by open-view examination that this was due to the existence of the fibrous masses within the incomplete bony walls of the compartments of the jawbone structure (Fig. 4). In general the radiopacity was variable in amount and irregularly dispersed in the periapical areas of the two bicuspids in the roentgenographic field up to the area of the second molar where it was of "ashy density."

A roentgenogram also was taken of the masses removed, for the purpose of studying them outside their compartments. Again the idea was to have a clear picture of the tumor without superimposition of shadows of other structures. The varying amounts and degrees of osteogenesis in the fibrous masses appeared roentgenographically as areas of radiopacity (Fig. 5).

Operation • After premedication, the operation was performed with the patient under local anesthesia produced by means of injections at the tuberosity, the infraorbital foramen and the palatal foramen. An incision was made intraorally on the outer surface of the right maxilla, extend-

ing from the mesial side of the cuspid at the mucobuccal fold downward in a semilunar shape and ending in the mucobuccal fold at the mesial side of the third molar. Aspiration biopsy was tried, but no fluid was obtained. With sharp dissection the mucosa was separated from the bone. By means of surgical burs, gouges and chisels, the outer cortical plate was removed carefully. There was not much resistance encountered in the removal of the expanded cortical plate.

Full exposure of the bulk, after removal of the outer cortex in segments, revealed the presence of fibrous masses condensed together. These when exposed were found to be five lobes of firm consistency, each lying close together within incomplete bony walls of a compartment and varying in size. The lobules were carefully disengaged, and the bony partitions between them were removed. Then, other masses, smaller in size, were explored in deeper regions, and all of these were also shelled out. In deeper regions, the fibrous masses were not easily distinguishable from the bone, and they were less rounded than the masses found near the outer cortical plate. After complete eradication of the growth, sharp edges were removed by rongeur forceps, and the excision was overextended slightly. The region was carefully débrided, and insufflation with penicillin and sulfanilamide powder was carried out. The flap was replaced and was sutured back by means of interrupted sutures with no. 000 black silk suture. A small sterile gauze wick was placed in the center between two sutures for intraoral drainage.

Postoperative Course • An ice bag was applied for the first 24 hours postoperatively. The swelling was minimal, and no postoperative pain was experienced by the patient. Continuance of careful oral hygiene was recommended (saline mouthwash). As a prophylactic measure, 400,000 units of penicillin was administered on each day for five days postoperatively. The wick left for intraoral drainage was removed on the second day. The wound

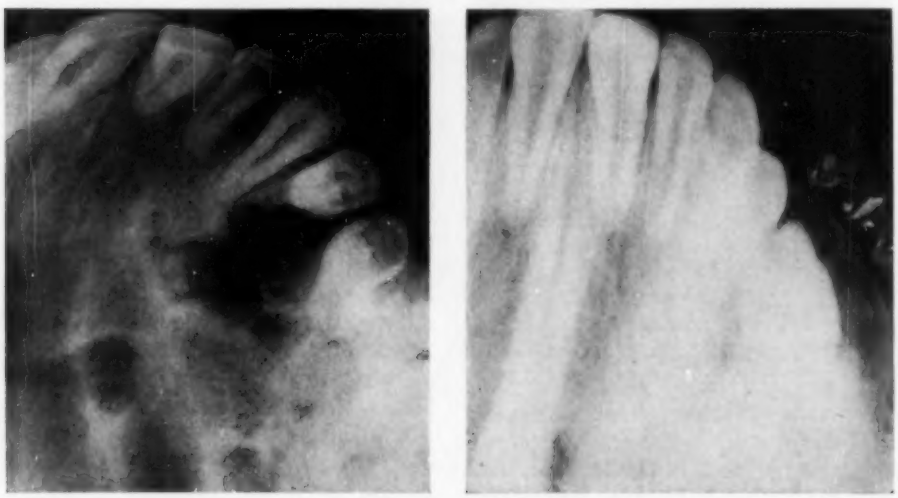

Fig. 3 • Left: Occlusal view showing radiolucent regions periapically as well as deposition of bone and stippled appearance. Right: Special occlusal views showing bulging part of growth separated from rest of jaw and multilocular appearance

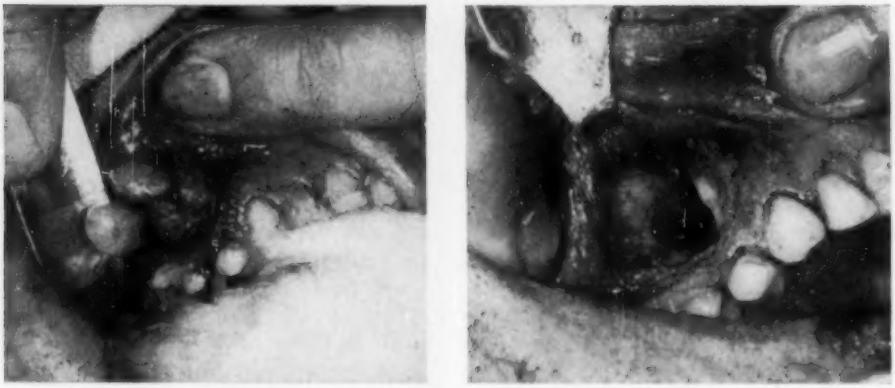

Fig. 4 • Left: Small masses of fibroid tissue found after reflection of mucoperiosteum and removal of thin outer cortical plate. Right: Region after complete enucleation of fibroid tissue

healed well, and the sutures were removed on the fifth postoperative day.

Three weeks after the operation, the patient was referred to the radiology department for irradiation of the right maxilla to arrest any further growth of the tumor and to prevent recurrence of the deformity. The patient was treated by a 200 kv. conventional therapy unit, with the focal-skin distance being 50 cm. Two fields were employed, one anterior 4 by 4 cm. and one lateral 7 by 7 cm. Both fields were treated on the same day, each being given a surface dose of 150 r. The total dose for each field was 1,650 r in 11 days.

Recovery was uneventful, facial contour was restored and the teeth related to the growth were spared.

Pathological Report • The sections of the tumor when examined microscopically showed a well-encapsulated cellular fibroma with interlacing and crisscrossing bundles of fibroblasts (Fig. 6). Regions of calcification were noted throughout. Actual spicules of irregular bone were seen in parts of the sections. No evidence of malignancy was noted. The diagnosis was cellular fibroma with foci of ossification.

COMMENT AND CONCLUSION

The lesion of ossifying periapical fibroma is composed in some regions of fibrous tissue and delicate bone trabeculae or calcified masses. In other parts of the lesion, more bone is produced, simulating what might be called osseous fibroma, and, in other regions, there is more bone than fibrous tissue and the term "fibrous osteoma" could be used to describe the condition. The variation in the proportion of fibrous tissue to calcific formations has been almost the only justification for the various terms describing the disease.

The transitional regions within the same lesion demonstrate the disease in its immature active stage, which was illustrated in the case report in this paper. The structural findings from either roentgenographic or microscopic examination show the immaturity of the lesion, as seen in the partial transformation into osseous composition in the multiple ossifying fibromas in the case reported. This lesion as a whole, however, could be considered still active. The activity is expressed by the increase in size before the final stage of complete maturation with no more differentiation was achieved. A compact mass of bone might be the ultimate result

of the potential maturation and activity, and the resultant condition might be called an osteoma.

Dropping some of the descriptive terms might eliminate the controversies and confusion. The term "ossifying periapical fibroma, single and multiple," is believed to describe adequately the condition as it occurs within the jawbones.

With more instances of the disease currently being reported in males, the prevailing idea that the disease occurs more frequently in females may well be changed. Also the theory that the disease is related to systemic conditions or bacteriological or inflammatory factors might well be discarded. It is still doubtful whether trauma is a factor in the disease, mainly because the data given by patients might not be complete, as in the instance reported in which the patient said trauma had occurred.

Although routine roentgenographic examination may reveal the presence of the lesion, the vague neuralgias, pain and discomfort or the disfigurement might lead the patient to seek treatment. The disease may be found anywhere within the jawbones. The lesion in the case reported was found in the maxilla distal to the cuspid, and it did not invade the antrum. The roots of the bicuspids were widely separated by the growth, and also

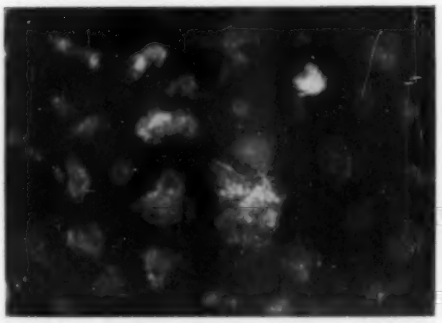

Fig. 5 • Roentgenogram of the 32 enucleated fibroid masses which composed tumor and which showed various degrees of ossification

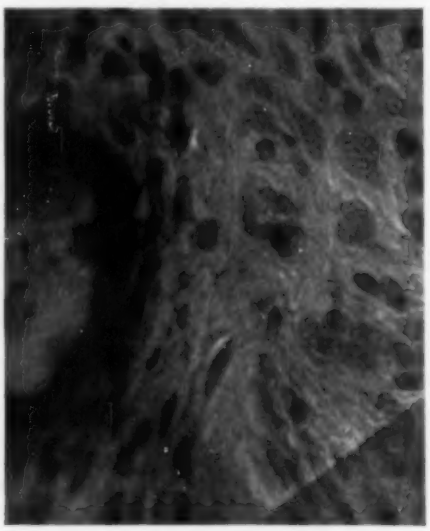

Fig. 6 • Photomicrographs of sections of tumor showing a well-encapsulated cellular fibroma with interlacing and crisscrossing fibroblasts. Note regions of calcification throughout. Actual spicules of irregular bone are seen in parts of section. No evidence of malignancy was noted, and the diagnosis was cellular fibroma with foci of ossification

the crowns were tilted slightly. The teeth related to the lesion were found to be vital. Disturbance of occlusion is a clinical feature that often reveals the presence of the lesion, particularly in the immature active stage of its development.

On roentgenographic examination characteristic multiple round radiolucent areas with a multilocular appearance that simulated other types of fibrous dysplasia give the appearance of cotton wool, ground glass or ashy density or punched out areas, and the stippled effect found is due to variable dispersed radiopacity. Such findings reveal the existence of various degrees of maturity and activity in the same lesion. Roentgenographic examination of the lesion from different angles and in different views, in addition to aspiration biopsy, establishes the proper diagnosis. These studies also ensure proper planning of the operative procedure.

Conservative surgery, sparing the related teeth, and overextension of the excision is the treatment of choice. Preferably, surgery should be followed by irradiation, particularly when the ossifying periapical fibromas are multiple and in their immature active stage. Irradiation may prevent further growth or recurrence of the lesion.

Range of movement of the mandible

Ulf Posselt, Odont. D., Malmö, Sweden

The purpose of this paper is to describe the range of mandibular movement as measured from a point at the anterior part of the mandible or one fixed in connection with it. The average habitual opening and closing paths are described in relation to the total range of mandibular excursions. Several important positions, the occlusal position, the rest position and the retruded position, are analyzed and classified.

MOVEMENT AREAS

The registration of Gothic-arch and needle-point tracings have been known for the past 50 years.[1] They are graphic records of a horizontal plane. When the mandible carries out all possible movements on this plane, the excursions of a point that is fixed in connection with the anterior part of the mandible describes a rhomboid figure.[2,3] This is known as the movement area on the horizontal plane (Fig. 1). At a given vertical opening, no movements can be made outside the extreme limits of this area. A movement area can also be recorded on the median plane. Therefore, each point on the mandible or in fixed connection with it has a definite range of movement. The extreme paths limiting this range are reproducible.[4]

Associate professor and head of the department of occlusal analysis and rehabilitation, Royal Dental School.

1. Gysi, A. Beitrag zum Artikulationsproblem. Berlin, A. Hirschwald, 1908.

2. Fischer, R. Die Öffnungsbewegungen des Unterkiefers und ihre Wiedergabe am Artikulator. Schweiz. Mschr. Zahnhk. 45:867 Oct. 1935.

3. Gysi, A., and Kohler, L. Zahnersatzkunde. Berlin, Urban and Schwarzenberg, 1929, p. 1-171.

4. Posselt, U. Studies in the mobility of the human mandible. Acta odont. scandinav. (Suppl. 10) 10:19 1952.

The horizontal movement areas become smaller as maximal opening is approached. This means that the movement area on the median plane gets narrower and ends in a point at the maximal opening. The movement area is related to the skull as is shown on a profile roentgenogram in Figure 2.

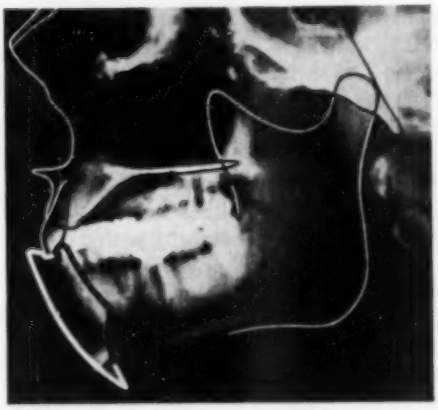

Fig. 2 • Movement area in median plane drawn on profile roentgenogram

MOVEMENT SPACE

By combining the graphic and roentgenographic records of different planes and levels, it is possible to construct the movement space of an anterior point (Fig. 3). The space is chiefly controlled by the joint guidances. Its upper surface, however, is governed mainly by the occlusal surfaces of the teeth (surface of contact movement).[5]

The movement space has a characteristic shape in most individuals, although it differs somewhat from one person to another. The shape of the movement space has been indicated by Fischer[2] and Hanau.[6]

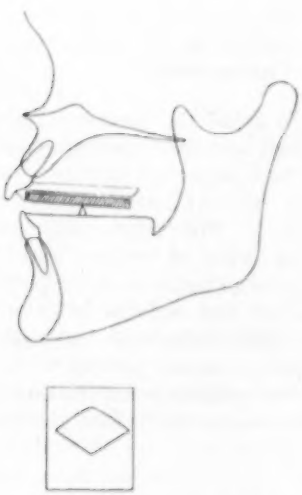

Fig. 1 • Above: Sketch of graphic recording apparatus used. Below: Rhomboid figure, its posterior aspect downward, usually recorded on glass plate

HABITUAL OPENING AND CLOSING MOVEMENTS

In conjunction with registrations of extreme movements, the habitual closing movements also were evaluated.[4] These paths of closure varied and always fell within the extreme movement areas. They, therefore, can be called intraextreme movements (Fig. 4).

At a greater vertical opening, the habitual closure path is anterior to that of the hinge movement. The records also indicated that rest position, generally, can be considered a position on the habitual path of closure.[4]

MOVEMENT AREA ON MEDIAN PLANE

The movement area on the median plane can be recorded graphically, or it can be cut as a median section of the movement space.

The area shown in Figure 4 is an average figure derived from 20 normal pa-

5. Posselt, U. Movement areas of the mandible. J. Pros. Den. 7:375 May 1957.

6. Hanau, R. L. Dental engineering. Shall we adjust an articulator to conform to anatomical and technical requirements or may we expect our patients to fit an average articulator? J. Nat. D. A. 9:595 July 1922.

tients. The figure shows the following characteristics:

1. The extreme posterior opening is indicated by the line RC—M. Its upper part is the hinge movement, H, which can be made to from 2 to 2½ cm. of opening.[4] Retruded positions at different degrees of opening inside the hinge-opening range lie on the hinge-movement path.

2. The extreme opening movements differ from the habitual opening and closing movements.

3. Posterior hinge movement is a pure rotation around an intercondylar axis. No other path of opening is concentric with it, and none of the other opening paths are of the same character.

4. The anterior extreme opening is not a hinge movement since it is not concentric with the hinge-movement path because the condyles move further forward when the mandible moves from the maximal protruded contact position, P, to maximal opening, M.

Fig. 3 • Movement space of point on an anterior portion of mandible

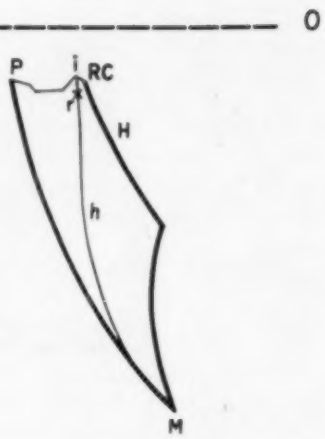

Fig. 4 • Average movement area on median plane, showing habitual closing movement (h), rest position (r), line parallel to occlusal plane (O), retruded contact position (RC), occlusal (intercuspal) position (i), protruded contact position (P), hinge movement (H) and maximal open position (M). Approximately natural size

5. The forward and backward glide between RC and P is somewhat irregular because of incisal and other tooth guidances.

THREE IMPORTANT POSITIONS OF THE MANDIBLE

Figure 4 shows the average relationship in patients without pathologic conditions of the three important positions: occlusal (i), rest (r), and retruded contact position (RC). The relationship between these positions, of course, varies individually in patients without pathologic conditions. The occlusal or intercuspal position does not coincide generally with the retruded contact position.[4, 7, 8]

The rest position is not situated on the hinge-movement path. Rest position and

7. Donovan, R. W. Cephalometric and temporomandibular joint radiographic study of normal and abnormal function of the temporomandibular joints. Dissertation, Northwestern University Dental School, 1953.

8. Posselt, U. An analyzer for mandibular positions. J. Pros. Den. 7:368 May 1957.

occlusal position are intraextreme positions.

CLASSIFICATION OF MOVEMENTS AND POSITIONS OF THE MANDIBLE

Differentiation between extreme movements and intraextreme movements has been suggested. It is important to differentiate between contact movements, that is, movements made with contact between the upper and lower teeth, and noncontact movements. In addition, movements are characterized by their direction, such as forward and lateral. Positions of the mandible, however, cannot be characterized by indication of direction.

Mandibular positions can be classified as follows: The occlusal position (i) is an intraextreme contact position, whereas the rest position (r) is an intraextreme noncontact position. Likewise, extreme positions, such as those on the hinge-movement path (H), are noncontact except one—the retruded contact position (RC) (Fig. 4).

Any mandibular position or movement can be classified and, at the same time, can be characterized by means of this nomenclature.

SUMMARY AND CONCLUSION

The range of mandibular movement in normal patients without pathologic conditions has been described. It has not been the purpose of this paper to discuss the principles used in bite registration and occlusal rehabilitation in relation to the ideal occlusal position.

In patients with pathologic conditions, all three positions—occlusal, rest and hinge positions—may have undergone changes.

Marginal fit of direct acrylic restorations

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An important prerequisite of a permanent filling material is its adaptability to the cavity walls, that is, its ability to hold a tight margin, for it is obvious that a filling material is no better than its cavity-sealing property.

One of the most difficult problems encountered with self-polymerizing resin is the volumetric shrinkage of the filling during polymerization.

It has been reasoned that the acrylic resins do not seal cavities well because of this excessive shrinkage, and that this shrinkage may result in contraction of the restoration from the cavity walls with resultant leakage or even clinical loosening of the filling.

A series of experiments have been undertaken, resembling as closely as possible actual clinical conditions, in an attempt to assess the cavity-sealing properties of the newer self-curing resins. Some

This paper received the A. Gratov Award for Dental Research, 1956.

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of the materials currently in use have been tested and different methods of application employed in an attempt to evaluate any eventual differences between the various brands or the various methods of use. Simultaneously the older and established filling materials have been tested in the same way in order to provide for comparison in the evaluation of the results. Finally, the clinical effect of the great difference in the coefficient of thermal expansion between the tooth and the self-curing acrylic resin was tested in order to evaluate more closely the marginal fit of these restorations under conditions simulating those in the mouth.

REVIEW OF THE LITERATURE

A number of authors have investigated the cavity-sealing properties of the self-polymerizing acrylic fillings and tried to elucidate whether the polymerization shrinkage inherent in the material can be overcome sufficiently in order to make this resin a satisfactory filling material.

Most of these experiments used dyes to test for leakage at the junction of cavity wall and filling. Grossman[1] (1939) tested various temporary filling materials for their permeability to dyes, saliva and test organisms. He reported that apparently because of the viscosity of saliva the filling resisted the penetration of saliva better than that of dye alone. It is assumed, therefore, that if a filling material seals a cavity so tightly that dye cannot penetrate, it would also seal a cavity against the penetration of saliva.

Fischer[2] (1949) used vacuum and iontophoresis in addition to capillary diffusion in order to encourage the penetration of the dyes (Prontosil Rubrum Solubile). Almost no filling material proved satisfactory, neither the self-curing resins nor the older and established materials.

Castagnola[3] (1950) relied on capillary diffusion for the penetration of the dye. He, however, tried to simulate clinical conditions even more closely by immersion of his specimens into saliva (fresh daily) for about two months, before subjecting them to the dye treatment, also for a period of two months. He found that all the then available acrylic resins, contrary to amalgams, permitted penetration of the dye; cements and silicates gave still worse results.

Buchanan[4] (1951) found no dye penetration with acrylic fillings as opposed to silicate and concluded that with a careful technic a tight seal of filling and cavity wall could be obtained and the junction made impervious to the passage of aniline dyes.

This statement was corroborated by McLean and Kramer[5] (1952) who also obtained an effective seal between resin and dentin.

Fiasconaro and Sherman[6] (1952) tested the sealing properties of acrylic restorations by means of air pressure. A filling was made in a freshly extracted tooth, the root cut off and a tube assembly attached to the pulp chamber. The tooth was kept under water and the air pressure necessary to cause bubbles to appear around the restoration was measured. They found low readings for the acrylic fillings as compared to the other materials, but could not state whether the consistently low pressure readings indicated an unsafe restorative material.

Kraus and Kraus[7] (1951) employed a

1. Grossman, L. I. Study of temporary fillings as hermetic sealing agents. J. D. Res. 18:67 Feb. 1939.

2. Fischer, M. Experimentelle Untersuchungen über die Abschlussdichtigkeit der in der Zahnheilkunde gebräuchlichen Füllungsmaterialien. Schweiz. Mschr. Zahnhk. 59:595 Aug. 1949.

3. Castagnola, L. Experimentelle Untersuchungen über im Munde selbst-polymerisierende Kunstharzfüllungen. Schweiz. Mschr. Zahnhk. 60:880 Sept. 1950.

4. Buchanan, G. A. Resistance of self-curing acrylic resin to the passage of dye between filling and cavity wall. J. Canad. D. A. 17:131 March 1951.

5. McLean, J. W., and Kramer, I. R. H. A clinical and pathological evaluation of the sulphinic acid activated resin for use in restorative dentistry. Brit. D. J. 93:255 Nov. 18, 1952.

6. Fiasconaro, J., and Sherman, H. Sealing properties of acrylics. New York D. J. 18:189 May 1952.

7. Kraus, E. E., and Kraus, L. L. Evaluation of the auto-polymer direct plastic filling materials. (Abst.) J. D. Res. 30:498 Aug. 1951.

bacteriological study to prove that the self-polymerizing resins do not seal cavities hermetically.

It should be pointed out, however, that most of these experiments deal with the older type of self-curing acrylic resins which are no longer used clinically. With the exception of the paper by McLean and Kramer,[5] none of them shows the acrylic resins in their true light, since no cognizance is taken of the improvements in these materials, such as cavity seals, which increase the adherence of filling to tooth. Furthermore, the newer brush-on technic with its successful overcoming of contraction has not been tested in any of the articles mentioned. Finally, some of the authors used histological fixation for their specimens, without taking into consideration the deleterious effects of a Formalin-imbued tooth on the self-curing acrylic resin.

Radiocalcium was used in several investigations.[8, 9] Most filling materials thus tested *in vitro* showed varying amounts of penetration around the margins. However, the technic of insertion seemed to have a definite influence on the amount of penetration. This fact was also proved *in vivo* on dogs by Brown[10] (1953).

Nelsen, Wolcott and Paffenbarger[11] (1952) pointed out that the coefficient of linear thermal expansion of the heat-cured acrylic resins was 81 ppm per degree Centigrade and assumed the coefficient of the self-curing resins to be similar. This would make their linear dimensional change approximately seven times that of tooth structure, whose coefficient of linear thermal expansion is 11 ppm per degree Centigrade. They found that temperature changes of teeth and restorations in the mouth could cause a marginal space of about 10 microns and an oozing of fluid between the teeth and the restorations. Whereas this was true for most filling materials, marginal percolation was most noticeable in the case of the self-curing resins.

Spreter von Kreudenstein[12] (1953) examined the coefficient of linear thermal expansion of the self-curing resins and found it to be dependent on the technic of insertion and whether examination was made with the specimen dry or wet. He found that if it was examined in a wet state—corresponding more closely to conditions in the mouth—the coefficient was greater by almost 50 per cent than that assumed by Nelsen and co-workers (120 ppm per degree Centigrade instead of 81 ppm).

Seltzer[13] (1955) tested the penetration of color-producing microorganisms through the margins of restorations, both at body temperature and after various temperature changes. In no instance did the organisms penetrate the margins of the assorted fillings at body temperature. However, penetration took place in some of the teeth that had undergone thermal changes. This happened in 21.3 per cent of the acrylic fillings and only in 5 per cent of amalgam fillings.

MATERIALS AND METHODS

This investigation was carried out in two parts.

Part A • This part of the study dealt with the marginal fit of the self-curing resin fillings at 37° C.

Three hundred and two cavities were prepared in freshly extracted, intact human teeth. After being marked at their

8. Armstrong, W. D., and Simon, W. J. Penetration of radiocalcium at the margins of filling materials: preliminary report. J.A.D.A. 43:684 Dec. 1951.

9. Sausen, R. E.; Armstrong, W. D., and Simon, W. J. Penetration of radiocalcium through acrylic margins. J. D. Res. 31:485 Aug. 1952.

10. Brown, D. W. Cavity-sealing properties of autopolymerizing acrylic and zinc phosphate cement. (Abst.) J. D. Res. 32:652 Oct. 1953.

11. Nelsen, R. J.; Wolcott, R. B., and Paffenbarger, G. C. Fluid exchange at the margins of dental restorations. J.A.D.A. 44:288 March 1952.

12. Spreter von Kreudenstein, T. Thermische Volumenänderung und Randschluss von Füllungen aus Schnellhärtendem Kunststoff. Deut. zahnärztl. Zschr. 8:143 July 1953.

13. Seltzer, S. Penetration of microorganisms between the tooth and direct resin fillings. J.A.D.A. 51:560 Nov. 1955.

Table 1 • Distribution of fillings made (Part A) and their relative resistance to the penetration of the dye

Filling material	No. fillings	Penetration of dye: 0 No.	0 %	+ No.	+ %	++ No.	++ %	+++ No.	+++ %
Amalgam	42	31	74	10	24	1	2	—	—
Silicate	40	2	5	3	8	15	38	20	49
Acrylic resins									
Kadon	78	66	85	8	10	1	1	3	4
Sevriton	38	15	39	20	53	2	5	1	3
Orthofil	21	19	90	2	10	—	—	—	—
Zinc oxide-eugenol	33	9	27	16*	49	7	21	1	3
Phosphate cement	25	—	—	2	8	14	56	9	36
Gutta-percha	25	23	92	2	8	—	—	—	—
Total	302								

*Mostly due to absorption of dye by filling material itself; no penetration into dentin.

apical end by superficial notches for identification, they were filled with various filling materials (Table 1).

During the time between extraction and filling (which time was kept as short as possible) the teeth were kept in normal saline solution. After the initial set (15 to 20 minutes) the teeth were immersed into normal saline solution and kept in an incubator at 37° C. for 24 hours in order to allow for complete setting, and polymerization in the case of acrylic fillings. They were then carved and polished.

A collar of sticky wax was glued around the neck of the tooth. A piece of rubber dam was punched at equidistant points with holes of different sizes to correspond to the type of tooth (incisor, bicuspid and molar). The teeth were inserted into these holes so that the rubber dam closed snug around the wax collar, and household glue was used to unite rubber dam, wax collar and tooth and to make the joint impermeable to the passage of the dye. Care was taken, however, not to close the apical foramen.

The rubber dam was fixed into a glass trough which contained normal saline solution, so that the root ends were immersed into the saline solution. The upper side of the rubber dam which held the crowns of the teeth with the fillings was filled with a 2 per cent aqueous solution of aniline blue, and the whole was incubated for 72 hours at 37° (Fig. 1). After that period the teeth were removed from their mountings, washed to remove the excess color and ground on both sides, until median ground sections through the fillings were obtained. The teeth then were examined for the penetration of aniline dye between cavity and filling.

For purposes of evaluation, penetration was classified according to the following criteria (Fig. 2):

0: no penetration between cavity wall and filling material.

+: superficial penetration of dye only along junction of enamel and filling, without reaching dentin.

++: penetration of dye between dentin and filling all the way down to the floor of the cavity.

+++: penetration of dye all around the filling including the floor of the cavity and diffusion into the dentin and pulp.

Since the diffusion of a dye into a space such as this is a purely physical

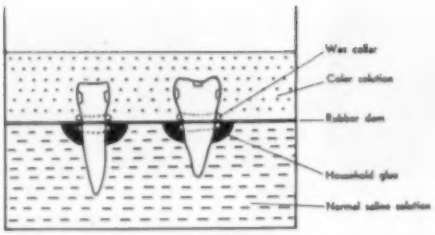

Fig. 1 • Diagram of experimental arrangement

phenomenon, it is dependent on the concentration of the color solution. The lower the concentration of the coloring medium, the easier will be the penetration into narrow spaces. For this reason a dilute, aqueous solution was used (2 per cent).

The side of the teeth which showed the most penetration of dye was used for tabulation.

Part B • This part of the experiment deals with the sealing properties of the self-curing resin fillings after they were exposed alternately to extreme heat and cold. Nelsen and co-workers[11] (1952) found in test subjects that the upper limit of thermal tolerance for ingestion of hot liquids was 60° C., whereas the lower limit of beverage temperature was 4° C.

Ninety cavities were prepared for this part of the investigation and were treated with aniline blue as described in part A. Afterward the crowns of these teeth were immersed alternately into hot water at 60° C. for one minute and immediately thereafter transferred into a 2 per cent solution of Prontosil Rubrum Solubile at 4° C. for one minute. This procedure was repeated about 25 times. After that, the teeth were ground as described before and examined.

In order to check the results, this part was repeated with a reversal in the order of the dyes used, that is, the red dye was used for 72 hours at 37° C. and the blue dye at 4° C.

Some additional teeth (20 cavities) served as controls. After immersion for 72 hours into the blue dye at 37° C., these teeth were transferred to the red dye solution at 37° C. for another 72 hours, without undergoing the alternate changes in temperature.

RESULTS

Part A • Table 1 shows the results of the experiments in which teeth were filled and immersed into aniline blue at 37° C. The table also gives the relative sealing properties of the various materials tested.

Amalgam, on the whole, gave satisfactory results. A carefully prepared and properly condensed amalgam filling sealed the cavity tightly, and no color penetrated at the margins (Fig. 3). The few instances in which the dye penetrated between cavity wall and filling could be attributed to faulty technic (Fig. 3).

Self-curing acrylic resins also showed very good marginal adaptation in this part of the investigation (Fig. 4). Some brands even seemed to surpass the amalgams in the percentage of fillings without leakage. Some variation in sealing property seems to exist between the various brands.

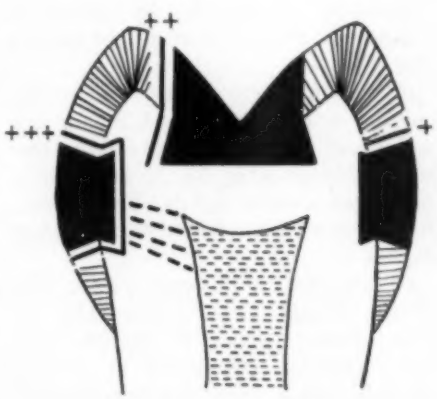

Fig. 2 • Diagram of tooth showing evaluation of penetration of dye between cavity and filling

Fig. 3 • Amalgam fillings. Satisfactory filling (left) and faulty filling (right)

Fig. 4 • Self-curing resin filling which shows good marginal adaptation

Fig. 5 • Zinc oxide-eugenol sealed cavity (left), gutta-percha (occlusal surface) and phosphate cement (right)

Fig. 6 • Silicate cement fillings

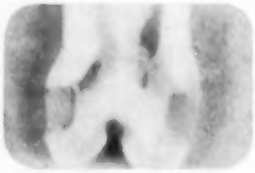

Fig. 7 • Silicate cement filling (left) and acrylic resin filling (right)

Fig. 8 • Amalgam filling (left) and acrylic resin filling (right)

Zinc oxide-eugenol sealed cavities tightly and only rarely did color penetrate into the dentin. The filling material itself, however, absorbed the dye to varying degrees. Sometimes, only the superficial part of the filling was stained blue (Fig. 5), whereas in other instances the whole filling was imbued with the blue dye.

Gutta-percha gave equally impressive results in its ability to hold a tight margin (Fig. 5).

Phosphate cement showed considerable leakage at the junction of filling and cavity wall and penetration of the dye into the dentin (Fig. 5). In no instance did it seal a cavity tightly. The cement, itself, showed color absorption to varying degrees.

Silicates gave still worse results. The silicate fillings almost invariably exhibited leakage around the margins. The dye penetrated the dentin to varying distances and in many instances reached the pulp chamber (Fig. 6). The silicate cement itself also showed absorption of the dye and was stained blue to varying degrees.

Part B • When the filling materials were exposed to temperature changes, their sealing properties were altered radically. When the teeth were heated to 60° C. and then plunged into a cold dye at +4° C., the acrylic fillings started to exhibit leakage and the cold dye penetrated between filling and cavity margin.

Thus a tooth that was first treated with the blue dye at 37° C. (in Part A of experiment), and later underwent the alternate temperature changes and was plunged into the red dye at 4° C., showed penetration of the red dye around the acrylic fillings. No penetration of the blue dye was noticeable (Fig. 7, 8). Thus the self-curing resins resisted dye penetration at 37° C., whereas they started to show leakage after undergoing changes in temperature.

In amalgam fillings, no effect of the temperature changes was noticeable (Table 2 and Fig. 8). Fillings which

sealed tightly, and thus showed no penetration of aniline blue at 37° C., remained tight even after the alternate changes in temperature. Fillings which were defective and showed leakage exhibited a violet color around the margins (Fig. 7), indicating that both colors had penetrated.

Silicates also did not show any effect of the temperature changes (Table 2). Since marginal adaptation was unsatisfactory, the violet color was much more pronounced (Fig. 9).

Identical results were obtained with a reversal in the order of the dyes used. Teeth that were first treated with the red dye at 37° C., as in Part A, then immersed into hot water at 60° C. and plunged into the blue dye at 4° C., showed penetration of the cold dye (aniline blue) around the acrylic fillings (Fig. 10, 11). No effect was noticed in amalgams and silicate fillings.

The observations on the control teeth of this part of the experiment were similar to those in Part A. Consecutive immersion into two different dyes at 37° C., without temperature changes, did not alter considerably the results obtained in Part A (Table 2).

Filling materials which exhibited good marginal sealing properties resisted the penetration of both dyes to the same degree that they had resisted the penetration of one dye in Part A. Thus, amalgam and acrylic resin fillings gave satisfactory

Table 2 • Distribution of fillings made (Part B) and their relative sealing properties

Experimental group

Filling material	No. fillings	Penetration of dye: Aniline blue (+37° C.) 0 No.	0 %	+ No.	+ %	++ No.	++ %	+++ No.	+++ %	Prontosil Rubrum Solubile (+4° C.) (after repeated immersion in hot water at 60° C.) 0 No.	0 %	+ No.	+ %	++ No.	++ %	+++ No.	+++ %
Amalgam	24	17	71	6	25	1	4	—	—	16	67	6	25	2	8	—	—
Silicate	21	1	5	3	14	8	38	9	43	3	14	4	19	10	48	4	19
Kadon	45	41	91	2	5	1	2	1	2	3	7	8	18	27	60	7	15
Total	90																

Control group

Filling material	No. fillings	Penetration of dye: Aniline blue (+37° C.) 0 No.	0 %	+ No.	+ %	++ No.	++ %	+++ No.	+++ %	Prontosil Rubrum Solubile (37° C.) (without alternate changes in temperature) 0 No.	0 %	+ No.	+ %	++ No.	++ %	+++ No.	+++ %
Amalgam	7	6	86	1	14	—	—	—	—	6	86	1	14	—	—	—	—
Kadon	7	7	100	—	—	—	—	—	—	7	100	—	—	—	—	—	—
Silicate	6	—	—	1	17	2	33	3	50	—	—	1	17	3	50	2	33
Total	20																

Fig. 9 • Acrylic resin filling (left) and silicate cement filling (right)

Fig. 10 • Acrylic resin filling (left) and silicate cement filling (right)

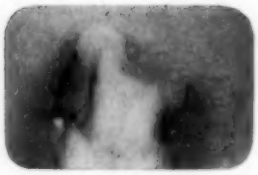

Fig. 11 • Silicate cement filling (left) and acrylic resin filling (right)

Fig. 12 • Acrylic resin filling (left) and amalgam filling (right)

Fig. 13 • Silicate cement filling (left) and acrylic resin filling (right)

results, whereas silicate cements showed considerable leakage (Fig. 12, 13).

DISCUSSION

The results obtained in Part A of this investigation show that with the newer self-curing acrylic resins and the improvements in technic a direct resin filling with good marginal seal could be made.

This fact seems to be in contradiction to the rather mediocre results obtained clinically. Even carefully executed direct resin fillings exhibit varying degrees of brown marginal discoloration after a relatively short time.

One of the factors that might be responsible for the subsequent deterioration of the self-curing acrylic fillings is the great difference in the coefficient of linear thermal expansion between tooth and self-curing resin.

Nelsen and co-workers[11] showed that when a tooth holding an acrylic filling is chilled, as happens during ingestion of iced beverages, the filling will contract more than the tooth. Space will be created between filling and tooth substance, and oral fluids will penetrate. The measurements by Spreter von Kreudenstein[12] showed this space to be considerably bigger than was assumed by Nelsen and co-workers.

The observations in Part B of this investigation showed that this difference in coefficient of expansion not only is of theoretical interest, but also has practical implications. The fact that the dyes at 4° C. were able to penetrate between tooth and filling material shows this difference in coefficient of expansion to be a factor in the subsequent deterioration of the marginal fit of the self-curing acrylic resins. Although these undoubtedly exhibit a very satisfactory initial cavity seal, this quality seems to be lost after they are exposed to the constant temperature changes in the oral cavity.

These findings corroborate those of Seltzer,[13] who also found that initially well-sealing acrylic fillings deteriorated under the subsequent influence of temperature changes.

SUMMARY AND CONCLUSION

Capillary diffusion of dyes was used in order to investigate the cavity-sealing properties of direct filling resins as compared with the established filling materials.

Three hundred and two cavities were prepared in freshly extracted, intact human teeth. They were filled with various filling materials, immersed into a 2 per cent solution of aniline blue at 37° C., ground and examined for penetration of dye between filling and tooth.

Amalgams showed no dye penetration and thus showed a tightly fitting margin. Direct filling resins were a close second. Silicates and oxyphosphate cement showed considerable leakage and even diffusion of the dye into the filling material itself. Zinc oxide-eugenol sealed cavities well, but its superficial layer showed some color absorption.

Ninety additional cavities were used to prove that this good initial cavity seal of the self-curing acrylic resins deteriorated, after undergoing alternate temperature changes. Thus when the teeth were immersed into a cold dye at 4° C., this penetrated around the margins of the acrylic fillings. This penetration is to be attributed to the large difference in thermal expansion between tooth and resin, and this fact is offered here as a possible explanation for the unsatisfactory behavior of many acrylic fillings in clinical work.

Incidence of clinical manifestations of periodontal disease in light of oral hygiene and calculus formation

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In the fall of 1951, the Norwegian Institute of Dental Research started a study on the dental conditions of the employees at Standard Telefon og Kabelfabrik. The main object of this investigation was to evaluate the effect of strictly local treatment of periodontal disease. Because of this purpose, it was necessary to record the dental and gingival conditions thoroughly before beginning the treatment. Some of the data from these initial examinations are given in this article.

MATERIAL

At the manufacturing company, there were about 1,650 employees, and, of these, 1,453 (1,202 men and 251 women) voluntarily appeared for the initial examination and treatment. In this report only the data on the men are given.

The employees were divided into two groups, workers and staff members. The

Norwegian Institute of Dental Research.

Table • 1 Distribution of 1,202 men studied according to age and occupation

Age group	No. of workers	No. of staff members
20–25	47	14
25–35	268	117
35–45	267	157
45–55	161	98
55–65	36	27
65–70	7	3
Totals	786	416

Table 2 • Actual number of teeth present compared with possible number of teeth (32) in 1,202 men

Age group	Workers		Staff members	
	No. of teeth	Possible no. of teeth	No. of teeth	Possible no. of teeth
20–25	1,342	1,504	402	448
25–35	6,522	8,576	3,225	3,744
35–45	4,541	8,544	3,426	5,024
45–55	1,991	5,152	1,727	3,136
55–65	242	1,152	430	864
65–70	37	224	9	96

latter group was composed of office personnel, engineers who were university graduates, technicians and foremen. At the time of examination, the average income for the workers was 11,450 Norwegian crowns a year and for the staff, 13,100 crowns a year. From Table 1 the distribution of the 1,202 men according to age and occupation can be seen.

The medical examination showed that the majority of the men were in good physical condition.

The individuals were examined in a dental office with modern equipment. The observations were recorded on a specially made punch card. The initial examinations were done by all three of us. The different criteria were thoroughly discussed in advance, however, so that the views on the criteria were uniform. In addition, we frequently checked each other's observations by means of re-examination.

NUMBER OF TEETH

Tooth mortality has been the subject of extensive studies. Brekhus,[1] Pelton and co-workers[2] and Marshall-Day and co-workers[3] found that at age 45 to 50 about 50 per cent of the teeth had been lost. Klein[4] observed that tooth mortality decreased as the income increased.

For an accurate study of periodontal disease in a series of subjects, it is necessary to have information on the tooth mortality or, even more important, on the number of teeth present at the time of the examination. Therefore, the number of teeth present was studied in relation to age and occupation in this series of subjects.

Method • On a diagram of the 32 teeth printed on the punch card, the teeth missing in each patient were marked off (edentulous patients were included).

Observations • The number of teeth present is given as the percentage of the possible number of teeth. Thirty-two was used as the possible number of teeth, although it is known that some or all of the third molars and even other teeth may not have been formed at all.

The actual number of teeth is compared with the possible number of teeth in each group in Table 2, and a bar graph based on these data is shown in Figure 1. It may be noted that the number of teeth was found to decrease steadily from the youngest to the oldest age groups and that the decrease was

1. Brekhus, P. J. Report on a statistical investigation on the loss of human teeth. J.A.D.A. 15:679 April 1928.
2. Pelton, W. J.; Pennell, E. H., and Druzina, A. Tooth morbidity experience of adults. J.A.D.A. 49:439 Oct. 1954.
3. Marshall-Day, C. D.; Stephens, R. G., and Quigley, L. F., Jr. Periodontal disease: prevalence and incidence. J. Periodont. 26:185 July 1955.
4. Klein, H. Tooth mortality and socio-economic status—life tables of teeth. J.A.D.A. 30:80 Jan. 1943.

strikingly more pronounced among the workers than among the staff members.

EFFICIENCY OF ORAL HYGIENE

Carefully made studies on the efficiency of oral hygiene seem to be rather scarce. Pindborg[5] observed a lower incidence of gingivitis in persons who brushed their teeth frequently than in those who did not. Dahl and Muhler[6] state, "There appears to be little relationship between the time required to brush the teeth and the over-all oral hygiene, since females brush for shorter periods of time, but more are found to have good oral hygiene than males." Marshall-Day and co-workers[3] report that women brush their teeth more efficiently than do men and speculate as to the relative importance of better oral hygiene and more regular brushing as factors in the demonstrated lower incidence of gingival disease in women. It is of interest to consider the incidence of subgingival calculus, gingivitis, periodontal pockets and tooth mobility in light of the efficiency of oral hygiene.

Method • The employees are interrogated about the frequency of toothbrushing, and the examiner estimated the efficiency. In this study only the efficiency was considered, as it was apparent that a high frequency of brushing did not always mean that there was a high degree of efficiency or vice versa. Oral hygiene was characterized as effective when all the surfaces accessible to the toothbrush were free of any soft deposits, as partly effective when some of the surfaces were clean and as not effective when practically all the surfaces were covered with soft deposits which could have been removed had the toothbrush been used properly.

Observations • From Figure 2 it may be seen that the toothbrushing was only partly effective in the majority of the subjects. The highest degree of efficiency

5. Pindborg, J. J. Gingivitis in military personnel with special reference to ulceromembranous gingivitis. Odont. Tskr. 59:408 April 1951.

6. Dahl, L. O., and Muhler, J. C. Oral hygiene habits of young adults. J. Periodont. 26:43 Jan. 1955.

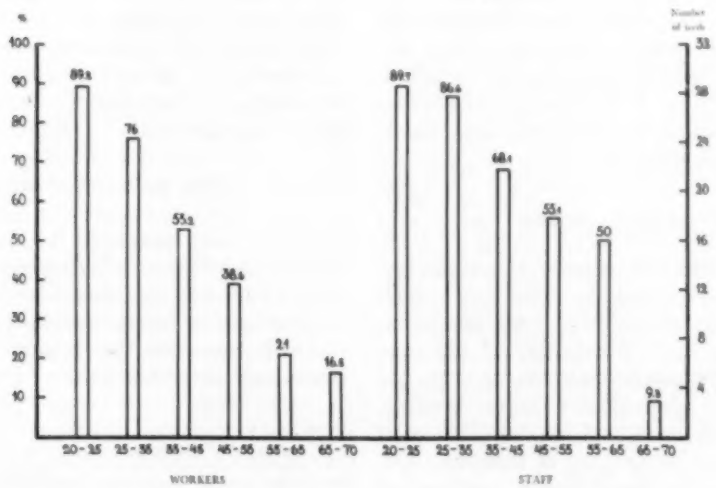

Fig. 1 • Number of teeth and percentage of teeth present out of possible number (32) for workers and staff members in each age group

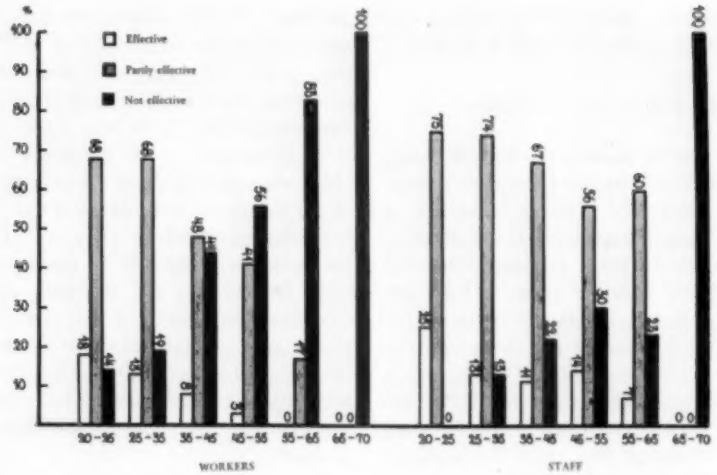

Fig. 2 • Efficiency of oral hygiene in 1,202 males, expressed as percentages of persons in each age group whose toothbrushing was effective, partly effective and not effective

in both groups (workers and staff) was found among subjects in the 20-to-25-year age groups. The number of persons whose toothbrushing was classified as effective decreased with age, and, at the same time, the number of persons whose toothbrushing was classified as not effective increased. There was a pronounced difference between the workers and the staff in regard to oral hygiene, as is best seen in the number of persons in the two groups whose toothbrushing was classified as not effective.

SUBGINGIVAL CALCULUS

The incidence of subgingival calculus has been investigated by Pindborg,[5] who found that 34 per cent of the persons in his series had no calculus, 52 per cent had supragingival calculus and 14 per cent had subgingival calculus. Westin,[7] in a study on school children, observed that about 70 per cent of them had calculus, and he found that 95 per cent of adults had calculus.

Marshall-Day and co-workers,[8] on examining a group ranging in age from 13 to 60 years, found calculus in 32 per cent of the individuals aged 13 to 15 years, with the incidence increasing to 91 per cent in the 56-to-59 age group.

The relative distribution of calculus on the buccal, lingual and proximal surfaces of the teeth does not seem to have been considered previously. Therefore, the distribution as well as the incidence of subgingival calculus in the present group was estimated.

Method • The presence of subgingival calculus was ascertained by means of very thin hoes, measuring 0.4 mm. from edge to back.[8] Such an instrument fastens easily in any calculus, even when it is deposited in thin layers. Special care was taken to examine the lingual side as thoroughly as the buccal side. The obser-

7. Westin, G., and others. Part 3. In Investigation into questions of social hygiene in counties of Vasterbotten and Norrbotten, Sweden. Royal Medical Board, Stockholm, Nordiska bokhandeln, 1937.

8. Waerhaug, J.; Arno, A., and Lovdal, A. Dimension of instruments for removal of subgingival calculus. J. Periodont. 25:281 Oct. 1954.

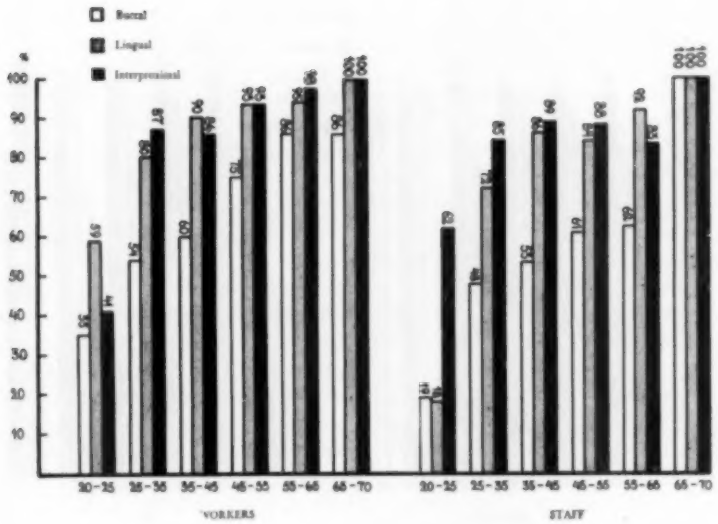

Fig. 3 • Distribution of subgingival calculus on buccal, lingual and interproximal surfaces. Number of calculus-covered surfaces expressed as percentages of possible number of surfaces in each age group

vations were charted on a diagram which allowed all four surfaces—mesial, distal, buccal and lingual—to be counted individually (in a total of 23,896 teeth with 95,584 surfaces). The presence of supragingival calculus was charted as well, but the incidence is not given here since it was present in practically all the patients in whom subgingival calculus was found. The incidence of subgingival calculus is given as the percentage of the possible number of surfaces for each group.

Observations • Figure 3 shows that subgingival calculus is common in the 20-to-25-year age group and that the incidence constantly increases with age. With the exceptions of a few age groups, subgingival calculus is found most often on the interproximal surfaces and most seldom on the buccal surfaces. There was less subgingival calculus among the staff members, and the difference in the incidence of subgingival calculus for the buccal surfaces as compared with that for the lingual and interproximal surfaces was slightly greater in the workers than in the staff members.

GINGIVITIS

The incidence of gingivitis has been extensively studied.[3, 5, 7, 9-19] The studies

9. Brucker, M. Studies on the incidence and cause of dental defects in children. III. Gingivitis. J. D. Res. 22:309 Aug. 1943.

10. Marshall-Day, C. D., and Shourie, K. L. Roentgenographic survey of periodontal disease in India. J.A.D.A. 39:572 Nov. 1949.

11. King, J. D. Gingival disease in Dundee. D. Record 65:9 Jan. 1945.

12. Macdonald, A. C. Bleeding gums in gingivitis in naval ratings. Lancet 2:697 Dec. 4, 1943.

13. King, J. D. Gingival disease in Gibraltar evacuee children. Lancet 1:495 April 15, 1944.

14. King, J. D. Dental disease in the Island of Lewis. Medical Research Council, special reports series no. 241. London, His Majesty's Stationery Office, 1940.

15. Massler, M.; Schour, I., and Chopra, B. Occurrence of gingivitis in suburban Chicago school children. J. Periodont. 21:146 July 1950.

16. Schour, I., and Massler, M. Gingival disease in postwar Italy (1945): I. Prevalence of gingivitis in various age groups. J.A.D.A. 35:475 Oct. 1947.

17. Schour, I., and Massler, M. Prevalence of gingivitis in young adults. (Abst.) J. D. Res. 27:733 Dec. 1948.

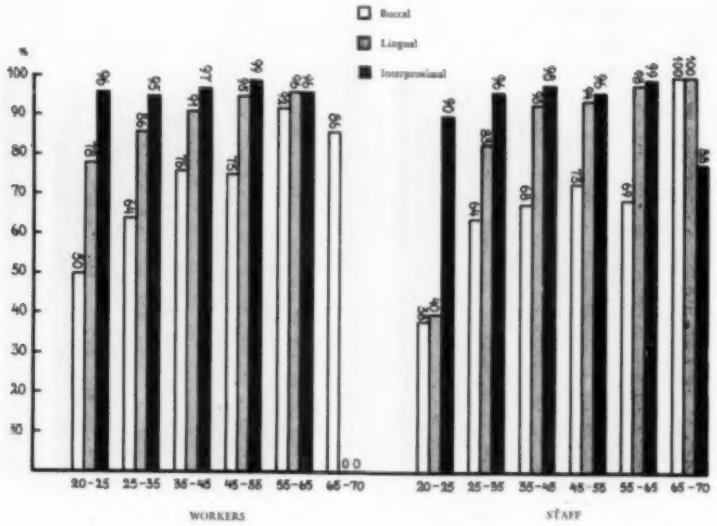

Fig. 4 • Distribution of gingivitis on buccal, lingual and interproximal surfaces. Number of surfaces with adjacent inflamed gingiva expressed as percentage of possible surfaces in each age group

have been carried out mainly in children and young adults. With the PMA system, Massler and Schour[16] introduced a simplified and quantitative method of ascertaining the incidence of gingivitis. Utilizing this system in a study in postwar Italy, they found that the percentages of subjects with gingivitis ranged from 40 in the 6-to-10-year age group to 98 in the 51-to-60 year age group. Marshall-Day and co-workers[3] found that

> . . . the incidence of gingival disease was extremely high even at an early age, ranging from 80% at age 13-15 years, to 95% at age 60, but with a significant reduction to 62% in the late teens and early twenties, particularly marked in the females.

The importance of standardized criteria has been stressed by many authors.[3, 20, 21] Since inflammation of the gingiva is the first clinical symptom of periodontal disease, the incidence and distribution of gingivitis was investigated in the present series.

Method • Redness and swelling of the gingiva, bleeding on pressure and pus secretion in the pockets were used as criteria of gingival inflammation in this series. No attempt was made to classify gingivitis as severe or mild, as experience with autopsy studies has indicated that conditions with mild clinical signs do not always produce mild histologic responses and vice versa.

Observations • Figure 4 demonstrates the incidence and distribution of gingivitis as percentages of the possible number of surfaces. In the 20-to-25-year age group gingivitis was present in 90 to 96 per

18. Schwartz, J. Teeth of the Masai. J. D. Res. 25:17 Feb. 1946.

19. Smart, G. A. Incidence of gingivitis in Royal Air Force. Brit. M. J. 2:242 Aug. 19, 1944.

20. Belting, C. M.; Massler, M., and Schour, I. Prevalence and incidence of alveolar bone disease in men. J.A.D.A. 47:190 Aug. 1953.

21. Chilton, N. W. Some public health aspects of periodontal disease. J.A.D.A. 40:28 Jan. 1950.

cent of the interproximal areas, and the incidence increased with age; it is most common interproximally and most infrequent buccally. Except for the youngest age group, there was little difference between the incidence in the workers and in the staff members.

POCKETS

Data on systematic clinical measurements of pockets do not appear to have been reported. According to the theory about the epithelial attachment, the epithelium, under favorable conditions, should be firmly attached to the tooth up to the gingival margin, and the ideal pocket depth would be zero. Complete absence of pocket, however, hardly ever is observed clinically. The explanation seems to be that the connection between the cells of the epithelial attachment and the tooth surface is extremely weak and that the epithelial attachment belongs to the lining of the clinical pocket.[22]

Clinical measurements have shown that in adults the depth of healthy pockets without subgingival calculus is, as a rule, between 1.5 and 2.5 mm., seldom being more than 3 mm.[22] A pocket depth of 2.5 mm., consequently, must be considered to be within the normal range, whereas pockets of more than 2.5 mm. usually occur in association with pathologic conditions. If a pocket has become as deep as 5 mm., it is definitely patho-

22. Waerhaug, J. Gingival pocket: anatomy, pathology, deepening and elimination. Odont. Tskr. (Suppl. 1) vol. 60, 1952.

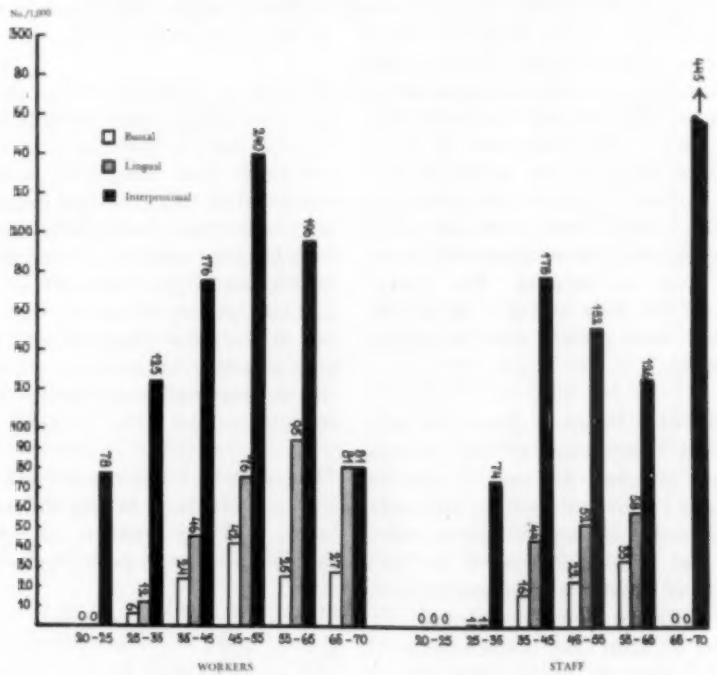

Fig. 5 • Distribution of pockets between 2.5 and 5 mm. in depth that were adjacent to buccal, lingual and interproximal surfaces. Expressed as number of pockets per 1,000 possible surfaces in each age group

logic and conservative treatment is not likely to be successful. Thus, 5 mm. may be the limit for treatment without gingivectomy.

The object of the investigation of pocket depth in this series was to provide more information on the incidence of pathologically deepened pockets and their relative distribution on the four surfaces of the teeth.

Method • Exact measurement of the pocket depth on all four surfaces of every tooth (a total of 23,896 teeth in the series of patients) was too time consuming to be carried out. Therefore, the examination to an approximation of the pocket depth in degrees—those measuring (1) less than 2.5 mm., (2) between 2.5 and 5 mm. and (3) more than 5 mm. The pocket depth was measured by means of an extremely thin hoe (0.4 mm. from edge to back) on which marks were made at 2.5 and 5 mm. It was inserted, with a pressure of approximately 40 Gm., until it met firm resistance. Earlier experiments have shown that in most instances such a force brings the instrument down to the deepest point of the epithelial cuff but not farther.[22] The pockets measuring between 2.5 and 5 mm. were charted on one diagram and those measuring more than 5 mm. on another. The pocket depths on the four surfaces of all the teeth that were present were measured individually.

Observations • Figure 5 shows the incidence and distribution of the pockets measuring between 2.5 and 5 mm. in depth, and Figure 6 shows the incidence and distribution of those measuring more than 5 mm. The incidence of the two categories of pockets is given as the number per thousand possible pockets.

It may be seen that pockets between 2.5 and 5 mm. in depth were seldom found on the buccal surfaces, were somewhat more common on the lingual surfaces and were found most frequently on the interproximal surfaces. Pockets of more than 5 mm. were not commonly found, but the distribution on the different surfaces was similar.

TOOTH MOBILITY

Tooth mobility has been the subject of many articles, and, lately, great ingenuity has been shown in constructing instruments for assessment of the degree of mobility.[23-25] Marshall-Day and others[3] studied tooth mobility, which was estimated as the percentage of the persons in the group who exhibited one or more mobile teeth. They found that tooth mobility rarely occurred before the age of 27 years and that the incidence increased with age. The incidence of mobile teeth rather than that of persons with mobile teeth, however, apparently has not been studied in large groups. Therefore, the degree of tooth mobility was estimated in this series of persons.

Method • None of the tooth mobility meters available were suitable for use in a mass study, as their operation required too much time. Therefore, mobility was estimated in degrees—first degree denoting teeth that were somewhat more mobile than normal, second degree denoting teeth that showed conspicuous mobility in the transverse direction but not in the axial direction and third degree denoting teeth that were mobile in the axial as well as in the transverse direction.

Observations • Increased tooth mobility was not observed before the age of 25 years, and the number of teeth with mobility was small even in the 25-to-35-

23. Mühlemann, H. R. Tooth mobility. J. Periodont. 25:22 Jan. 1954.

24. Forsberg, A., and Hägglund, G. Om tändernas rörlighet. Sveriges tandläk. förb. Tidn. 47:665 Dec. 1, 1955.

25. Lundqvist, C. Objektiva paradontala registreringsmetoder: III. Elektromagnetisk bestämning av tandmobilitet. Odont. Revy 7:9, 1956.

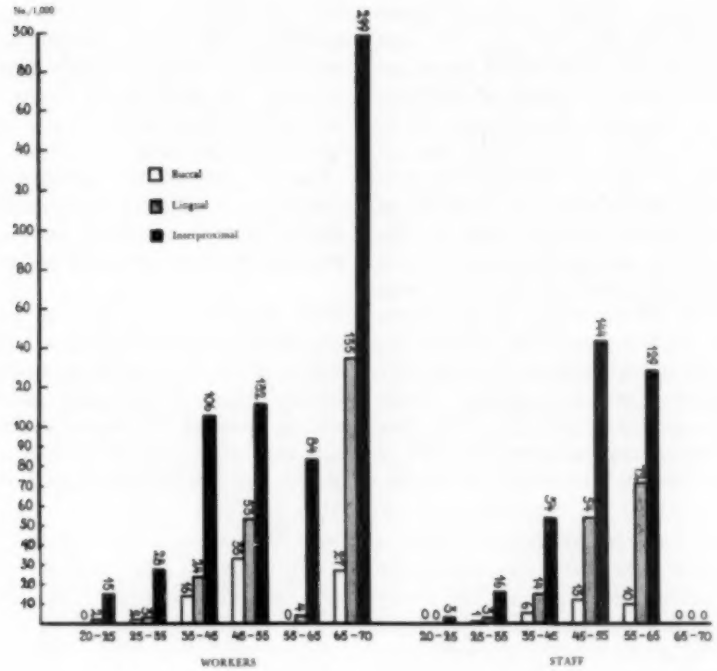

Fig. 6 • Distribution of pockets measuring more than 5 mm. in depth that were adjacent to buccal, lingual and interproximal surfaces. Expressed as number of pockets per 1,000 possible surfaces in each age group

year age group. From that age group on, it increased steadily with aging in both the groups. The number of mobile teeth was conspicuously greater among the workers than among the staff. First degree mobility was the most predominant in all age groups in which mobility occurred. In Figure 7, the number of teeth with each degree of mobility is given as the number per thousand possible teeth in each age group.

COMMENT

The most striking observations in this study are the differences between the data on the workers and those on the staff members (Fig. 1-7) and the differences in the distribution on the buccal, lingual and interproximal surfaces of calculus (Fig. 3), gingivitis (Fig. 4) and pathologically deepened pockets (Fig. 5, 6).

Number of Teeth • The observations on tooth mortality in this series of patients correspond rather well to those in earlier studies.[1-4] It is apparent that loss of teeth was found to be equally distributed in the groups of persons more than 25 years of age (Fig. 1), although caries may have been the main cause of extraction in the younger groups, with an increased incidence of periodontal disease in the older age groups.[20, 26, 27] It is interesting to note that the workers and the staff members

26. Aas, E. En undersøkelse av tannforholdene hos 550 voksne pasienter ved Ullevål kommunale sykehus, Oslo. Norske tannlaegeforen. Tid. 59:443 Nov. 1949.

27. Allen, E. F. Statistical study of the primary causes of extractions. J. D. Res. 23:453 Dec. 1944.

have the same average number of teeth (28) at 20 to 25 years of age, but, from then on, the incidence of tooth loss is definitely greater among the workers.

It is obvious that after the age of 25 the staff members take better care of their teeth than the workers, which is in accordance with the observations of Klein.[4] In the older age groups, the difference may be determined partly by the better economic status of the staff members, which allows them to get better and more regular treatment, but, for the younger age groups, this explanation cannot be the only one, as progressive leveling of salaries has made the difference between the average salary of the workers and that of the staff members inconsiderable (a difference of 1,650 Norwegian crowns). Thus, the better conditions found in the staff members must be explained by their being more "tooth-minded," which is clearly demonstrated by the estimated efficiency of oral hygiene (Fig. 2). Among the workers the percentage of ineffective toothbrushing was higher, and it is natural to see this in relation to the greater loss of teeth.

Oral Hygiene • The over-all picture of oral hygiene in both groups was rather discouraging. During the examination, it became apparent that most of the individuals brushed the buccal surfaces only and very often only the buccal surfaces of the front teeth. Only in exceptional

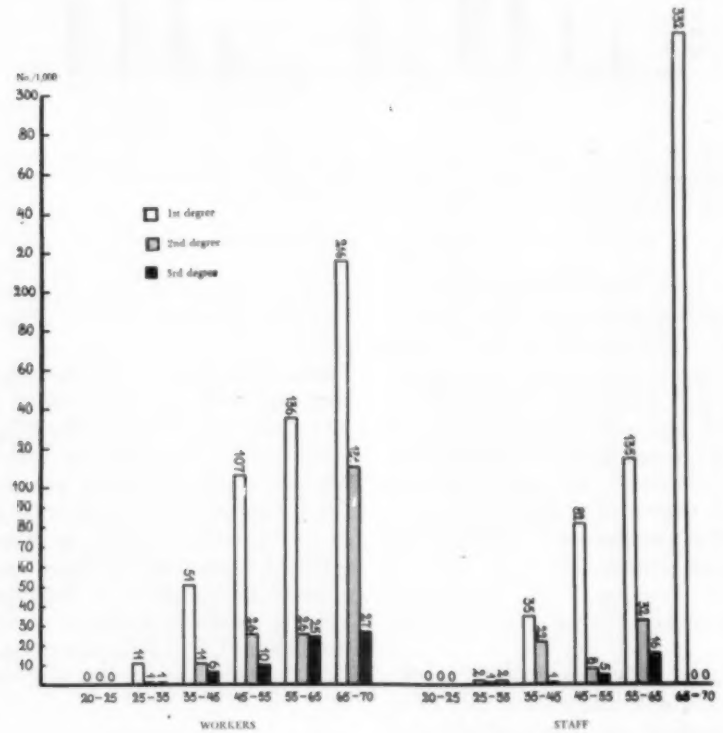

Fig. 7 • Incidence of teeth exhibiting increased mobility of first, second and third degrees. Expressed as number of mobile teeth per 1,000 possible teeth in each age group

persons was it found that dental floss or toothpicks were used. From the viewpoint of the prevention of periodontal disease, however, the cleansing of only one surface of the tooth may not be much better than no cleansing at all. The better hygiene in the 20-to-25-year age group, as compared with the decrease of efficiency with age, may be explained by the "greater awareness of oral hygiene and esthetic values at that age."[3]

Subgingival Calculus • The incidence and distribution of subgingival calculus (Fig. 3) should be looked on in light of the data on oral hygiene. The increased accumulation of subgingival calculus seems to correlate with the decreased efficiency of oral hygiene. Thus, the fact that subgingival calculus was found more frequently among the workers than among the staff members can be explained by the poorer oral hygiene in the former group. When the distribution of subgingival calculus on the different surfaces is considered in relation to the toothbrushing habits, it may be seen that calculus was found most commonly on those surfaces that are either inaccessible to the toothbrush (interproximal) or unsatisfactorily brushed (lingual), whereas those surfaces that are brushed most frequently (buccal) exhibit the lowest incidence of calculus. Apparently, no determination of the different distribution of subgingival calculus on the four tooth surfaces has been carried out in earlier studies. The problem, however, has been touched on by Hirschfeld.[28]

Gingivitis • When the incidence of gingivitis is compared with the incidence of subgingival calculus, a considerable similarity in the data can be noted, indicating a close correlation. Gingivitis is more common than subgingival calculus. Supragingival calculus and uncalcified bacterial deposits, which were not investigated, however, may have been present, although the effect may have been similar. Besides, restorations extending below the gingival margin also must be considered. Thus, there is reason to believe that calculus, with its superficial layers of bacterial plaque or plaque alone, together with faulty restorations, is related to gingivitis in most instances in this series of persons. The data on gingivitis correspond closely to those presented by Marshall-Day and others.[3] The somewhat higher percentage observed in their present series may have resulted from more emphasis having been put on examination of lingual and interproximal surfaces. As a matter of fact, many of the inflamed interproximal regions could be seen only from the lingual side.

Deepened Pockets • The study of the incidence and distribution of pathologically deepened pockets reveals interesting data (Fig. 5, 6). First, pathologically deepened pockets usually are located on the interproximal surfaces and are seldom found on the buccal surface. The over-all distribution pattern is the same as that of calculus and gingivitis. The differences, however, are accentuated. These data are interesting when considered in light of the observations made by Morris[29] on the "attachment level patterns of interproximal pockets." According to his observations, the bottom of the pocket is located most apically in the interproximal area, and it is well known that the gingival margin normally is located most occlusally in the same area. Therefore, it is understandable that the pocket depth is greatest in the interproximal area. It should be justifiable to presume that the increased pocket depth on the interproximal and lingual surfaces has been caused mainly by subgingival calculus having been formed more freely on these surfaces

28. Hirschfeld, I. Gingival massage. J.A.D.A. 43:290 Sept. 1951.

29. Morris, M. L. Attachment level patterns of interproximal pockets and their influence on shrinkage of inflamed gingival tissue. J. Periodont. 24:111 April 1953.

than on the better-cleansed, buccal surfaces.

It should be noted that the highest incidence of pathologically deepened pockets was found in the 45-to-55-year age group. In staff members with pockets between 2.5 and 5.0 mm. deep, the peak incidence occurred even in the 35-to-45-year age group. This failure of the incidence to increase with age seems to be explained by the fact that most of the teeth with pathologically deepened pockets have a rather short lifetime. Subsequent to extraction, the gingiva shrinks adjacent to the neighboring teeth and the pockets become shallower, although their bottoms may be located farther apically. From Figures 5 and 6, the first impression might be that pockets more than 2.5 mm. deep are rare. It must not be forgotten, however, that teeth with pathologically deepened pockets will not remain very long in the jaws if effective treatment is not instituted. Therefore, a high percentage of pathologically deepened pockets will not be observed.

Mobility • In the present series, increased mobility did not become a problem of importance until the age of 35 to 45 years (Fig. 7), and its occurrence coincided with the increase in the incidence of pockets of more than 5 mm. in depth. Thus, clinically observable loosening of the teeth is a later symptom of periodontal disease than gingivitis and pocket deepening. As with pockets of more than 5 mm., teeth with second and third degree mobility cannot be found in a high percentage, as their lifetime is limited. The fact that a greater number of mobile teeth was found in the workers than in the staff shows that the over-all dental conditions were better in the latter group.

Tooth mobility of all degrees increased continuously with age, in contrast to the incidence of pathologically deepened pockets, which reached a peak in the 35-to-45-year age group. This discrepancy is explained by the fact that the pocket deepening in the older age group is associated with recession of the gingival margin on the teeth adjacent to extracted ones. Thus, teeth with very little bony support may be surrounded by shallow pockets.

Evaluation of Sample • It cannot be claimed that the observations in this random sample of the Norwegian population are altogether representative of the whole population. First of all, about 200 subjects did not voluntarily appear for the examination and could not be forced to do so. There is reason to believe that many of these were edentulous persons and persons who had neglected their dental health, so that their conditions would have been found to be even poorer than the average condition of the examined persons. Therefore, it is likely that the observations in this series give a somewhat flattering picture of the whole population. The structure of this investigation, however, may be used in evaluating previous studies as well.

The fact that calculus, gingivitis and pathologically deepened pockets usually were concentrated on the interproximal and lingual surfaces shows that a true picture of the periodontal condition can be obtained only when these surfaces are examined. This procedure, however, is painstaking for examinations in large groups, and the selection of smaller areas on the buccal surface of the front region for investigation may give sufficiently reliable results for comparison, when it is kept in mind that this technic would give a picture of the condition of the teeth that is too favorable.

SUMMARY AND CONCLUSIONS

A random sample of the Norwegian population composed of 1,202 male employees of a modern manufacturing company were examined to determine the number of teeth present; the efficiency of oral hygiene; the incidence and dis-

tribution of subgingival calculus, gingivitis and pathologic pockets, and the incidence of tooth mobility. The men ranged in age from 20 to 70 years and were divided into two groups, workers and staff.

The following conclusions can be drawn from the data:

1. The over-all dental conditions were conspicuously better among the staff members than among the workers.

2. Loss of teeth was found to take place more or less continuously during life, but the incidence was higher among the workers than among the staff members.

3. The efficiency of oral hygiene was poor throughout the series. It was best in the youngest age group and decreased with age; it was poorer among the workers than among the staff members. Usually, only buccal surfaces were kept clean.

4. Deposition of subgingival calculus was common in the youngest age group and increased with age. It is observed most often on the interproximal surfaces, next in frequency on the lingual surfaces and least often on the buccal surfaces.

5. The distribution pattern of gingivitis was similar to that of subgingival calculus.

6. Pathologically deepened pockets were found to occur rarely before the age of 25 years. The incidence increased with age, but it seemed to reach a peak in the 45-to-55-year age group or even earlier. During this age span, loss of teeth apparently causes a reduction of the pocket depths of the remaining teeth. Pathologically deepened pockets are located most frequently on the interproximal surfaces and least often on the buccal surfaces.

7. A correlation exists between the efficiency of oral hygiene and the incidence and distribution of subgingival calculus, gingivitis and pathologically deepened pockets.

8. Increased tooth mobility does not become an important problem until the age of 35 years, but, from then on, it increases steadily with age.

9. The fact that the main clinical manifestations of periodontal disease, gingivitis and pathologic pockets, are observed most frequently on the interproximal and lingual surfaces implies that efforts at the prevention and treatment of periodontal disease should be directed toward these surfaces.

Education and Knowledge • Education is a high word. It is the enlargement, the illumination of the mind. It gives philosophical grasp, makes the intellect the master—not the servant—of the knowledge acquired by it. Education sets a greater value on judgment than on memory and mere learning. Its aim is not the solution of particular and immediate problems of our time, but the creation of a habit of mind which lasts through life, of which the main attributes are freedom, equitableness, calmness, moderation, and wisdom. *L. I. Newman, Becoming a New Person, 1950.*

The temporomandibular joint: function, dysfunction and dental treatment

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Temporomandibular dysfunction may be discussed from a physical basis.

The mandible is a rigid body in contact with the skull and is pulled about by the attached muscles. The system of control is irrelevant to this discussion, and so is the power and period of function of any muscle or group of muscles. As food between the teeth offers resistance to the upward movement of the mandible during mastication (penetration or grinding of food is implied by mastication) and as the muscles of mastication are attached posterior to the last tooth, one or both condyles must impinge on the structures that stop their upward movement. This subject is treated elsewhere[1] quite fully. A simple diagram illustrates this (see illustration).

When the teeth penetrate food, one or both (probably both) of the condyles tend to move upward. Neuromuscular control ensures that incision, trituration and mastication of food are done with maximum efficiency and minimum damage to dental and articular structures.

During chewing, the condyles move to and fro and rotate in order that teeth and muscles will accomplish mastication. The mandible is controlled by the muscles pulling the teeth against the food and by the muscles pulling and maintaining the condyles in various positions against the meniscus and articular fossa. The joint structures such as the meniscus and articular cavities act as shock absorbers and spread the backlash, as it were, through the skull. Simple physical analysis makes it impossible to assume that no forces are exerted in the joint region.

Descriptions of all mandibular action as that of a lever or attempts to assign a fulcrum or to find a center of rotation are inaccurate and therefore may confuse. Nor is it necessary to liken the joint to scythes, nutcrackers or double-hinged pliers. An infinite variety of movements occur as peanuts, popcorn and steak are prepared for digestion. In function the mandible behaves as all limbs do; it is pulled into various positions by muscles and is steadied by the controlled contact between moving and stationary parts in the joint.

This simple description is supported by many valid observations such as Gysi's experimental models, Benninghoff's trajectories and the many studies of the osteology of the mandible and joint. Macalister[2] found during the examination of 69 adult temporomandibular joints that some damage was present in 60; nine of these showed perforation of the meniscus. The majority of subjects had worn complete dentures. It seems,

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1. Roydhouse, R. H. Temporomandibular joint: upward force of the condyles on the cranium. J.A.D.A. 50:166 Feb. 1955.

2. Macalister, A. D. Microscopic survey of the human temporomandibular joint. New Zealand D. J. 50:161 Oct. 1954.

therefore, that the joint function is traumatic, as would be expected.

DYSFUNCTION OF THE JOINT

Once the proposition is accepted that during mastication the condyles exert force upon the articular fossa through the joint, the causes and results of injuries to the joint can be readily understood and principles of treatment may be devised.

The temporomandibular joint is similar to other joints in the body; forces arising from use pass through the joint. Acute or chronic pathological states in joints arise from atypical use of limbs. Any joint will become painful and affected if the limb is used so that damage exceeds repair within the joint. Housemaid's knee, sprained ankles and temporomandibular syndromes are all caused by some demand that the joint cannot sustain. The amount of damage depends on the extent of the misuse and on the power of the joint to recover; the symptoms recognized depend on the patient's state of mind. (The joint diseases of systemic origin such as rheumatoid arthritis that are outside the scope of treatment by the dental practitioner are not considered in this discussion.)

Symptoms in the temporomandibular joint region, therefore, may be caused by malfunction of the masticatory system. The dentist is concerned with malfunction attributable to malocclusions, habits and blows.

Abnormal occlusion may cause symptoms; a long catalogue of possibilities will not be attempted. Damage occurs in joints associated with malocclusions because the upward force on the condyle is increased, because the movement of the condyles may become excessive, and because there is a change in the relation between loading and movement; in normal chewing movements the condyle with the greatest load is usually stationary. Interferences with condylar function occur in gross malocclusions such as crossbites, overbites and Class II malocclusions. By preventing simultaneous even contact of upper and lower teeth or by affecting the mandible in the last stage of closing, single malposed teeth throw greater strains on the joint.

Projection of the mandible and teeth onto the occlusal plane is shown related to a side view of a hypothetical rigid body. FR, force due to food resistance. MF, force due to muscle pull. C, force exerted by fossa on condyles. If MF is of such value that FR is overcome, that is, food is crushed, then C must exist or the rigid body rotates. Therefore one or both condyles tend to move upward and thus exert force upon articular fossa

Habits may cause simple overloading in unnatural positions. For example, a saxophone player's symptoms of joint disorder were relieved by the tightening of his neck strap during performances. Bruxism is simply overwork. Blows cause sudden overloads.

The causes of temporomandibular dysfunction may be analyzed as atypical or excessive loading. A chronic temporomandibular arthritis of dental origin has as its analogy the much sprained ankle where cartilages and ligaments are loose and control of the damaging movements has been lost.

The relaxed opening and closing movements are of little significance in temporomandibular joint disorders. The chewing or the active use of the mandible produces the damage within the joint.

DIAGNOSIS

The symptoms arise in a bizarre and variegated form. The face and mouth play a large part in the emotional life and consequently affect the description of ills

in this region. Patients with normal occlusions but with temporomandibular syndromes will be seen seldom and probably will require general treatment for joint disorders or psychiatric treatment.

Most patients with joint symptoms will have natural teeth; those with dentures probably had gross malocclusions. It is unlikely that complete dentures resting on a slippery mucous membrane will direct the mandibular movements. The patient's mouth usually will adjust to occlusion of dentures through either the resorption of alveolar bone or the loss of function resulting from not wearing the denture. A zealous patient with excessive vertical dimension conceivably may damage his joints. In New Zealand where the majority of the adult population wear dentures, joint symptoms are not prevalent.

The diagnosis is obtained from three sources: the signs and symptoms from the joint itself, the occlusion and the interview. The signs and symptoms from the joint are notable for their variety and for the debate as to their cause. All possibilities will not be detailed; they are legion. Symptoms such as the clicking jaw, the pain on the mandibular movement, the limitation of movement and pain over the joint are similar to those associated with any injured joint.

The occlusion will be such that mastication is atypical, or that on closure of the jaws into centric occlusion, simultaneous even contact does not occur. The lack of simultaneous even contact in centric occlusion may be identified only from carefully mounted study casts.

The interview should establish whether the symptoms have been aggravated by the patient's mental state or whether some habit is responsible. By listening, an acute sympathetic observer will detect inconsistencies, obtain some idea of the patient's troubles other than his or her dental worries, and even help the patient by being the listener and so showing interest. To detect a habit responsible for the condition, the Sherlock Holmes approach seems to be necessary, for if the patient were aware of the cause, concealment would be unlikely.

Dental treatment can be undertaken only for patients with malocclusions; this is self-evident. The absence of occlusal causes must be established before the patient is referred elsewhere.

TREATMENT

The removal of the cause of temporomandibular joint dysfunction by the restoration of normal occlusion or the provision of a harmless occlusion are the dental objectives. In an acute attack with pain and limitation of movement, rest, heat and analgesics are required. The constant movement of the mandible complicates treatment. Head bandages, intermaxillary wiring and the removal of dental appliances help to enforce rest. This form of treatment can be undertaken in the absence of a diagnosis.

In chronic conditions a "bland" occlusion is to be attained, that is, one which does not wholly direct the movements of the mandible during chewing. No increase in vertical dimension beyond restoration of the desirable freeway space to not more than 2 to 4 mm. is contemplated, unless interference with function to promote rest is the object. Some writers have recommended overlaying the posterior teeth. In the acute attacks, relief of pain is experienced as a result of this procedure, but at the same time the posterior teeth may become depressed and the unfortunate result may be a return of symptoms with a posterior open bite. In those patients with severe overbites, a Class II occlusion, and a translatory movement of the condyle where rotation is expected, rest and the insertion of a Hawley plate with a bite-plane sufficient to eliminate intercuspation provide temporary relief from symptoms.

Occlusal grinding, the insertion of partial dentures, the extraction of malposed

teeth, the restoration of function to particular teeth and so on form the dental treatment. The extraction of all upper teeth or of all teeth may be necessary to achieve a better occlusion. Surgical procedures on the joint will do little good if gross occlusal disharmonies still exist; the joint after surgery cannot possibly be any better than the one the patient began with. In terms of results, meniscectomies, condylectomies, sclerosing solutions and the like with the possible limitation of movement or slow collapse of dental occlusion cannot be compared with the insertion of dentures. In part, decrease in function on the insertion of dentures probably effects the cure. Dentures are preferred to surgical intervention.

The patient under mental stress can be given dental treatment if the occlusion can be improved. When the dentist acting as a friend has helped the patient, or when in extreme cases psychiatric treatment has removed aggravating mental conditions, the dental treatment provides a face-saving excuse for the disappearance of the symptoms. Those patients with bruxism or some damaging habit require individual treatment with the aim, the restoration of normal function.

SUMMARY

Dysfunction of the temporomandibular joint can be treated by dentists, and signs and symptoms of this disorder can be alleviated. In general the temporomandibular joint will behave as other body joints. Hence disorders are treated similarly in that the restoration of normal function if abnormality is detected precedes surgical intervention on the affected joint.

The condyles move to and fro and rotate and tend to move upward during mastication, thereby causing some damage to the joint structures (as in all joints). Occlusal abnormalities or atypical jaw habits may increase the rate of damage beyond the rate of repair. Symptoms recognized by the patient will depend on his or her mental state.

Treatment by occlusal restoration by any means is the task of the dentist. Further occlusal abnormalities must not be forced on the patient. The provision of a suitable occlusion even by the insertion of complete dentures is considered. Surgical procedures on the joint are not desirable unless all other treatment fails entirely. Even so, such treatment in the presence of dental abnormalities is of questionable value.

The restoration of an occlusion with simultaneous even contact at the correct vertical dimension or an occlusion that does not direct mandibular movements to the detriment of the joint forms the basis for dental treatment of temporomandibular joint dysfunction.

Three Ideas in Human Development • Three ideas stand out above all others in the influence they have exerted and are destined to exert upon the development of the human race: (1) the idea of the Golden Rule; (2) the idea of the natural law, and (3) the idea of the age-long growth or evolution. ***Robert A. Millikan. The Measure of Man.***

A precision and biologic root canal filling technic

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The most important phase of root canal therapy is the proper filling of the root canals.[1-6] Jasper[7] states: "a well adapted and well tolerated [root-canal] filling is the final step in a good technic. The placement of such a filling has taxed the skill of the best operators." Pucci[1] remarks: ". . . efforts to rationally apply surgical and chemical resources are of no avail . . . if conditions demanded for a correct and adequate filling of root canals are not fulfilled in detail. . . ."

But what is understood by "a correct and adequate filling" since no agreement has ever been reached regarding the correct apical limit of the root canal filling? Generally speaking, recommendations for the apical limits of such fillings fall into four classifications: (1) overfilling,[8-12] (2) underfilling,[13] in which the filling does not reach the cementodentinal junction, (3) exact or foramenal filling,[14-17] in which the filling ends exactly at the apical foramen, and (4) cementodentinal junction filling,[18-26] in which the filling ends exactly at the cementodentinal junction. Some endodontists recommend different apical limits for the filling, depending on the pathologic condition present.[1, 17, 27, 28]

More than 250 different materials[29] have been used for root canal filling purposes. They can be classified into four groups: liquids, pastes, solids, and mixed. Pucci[30] reports 30 different root canal technics, and Callahan[31] reports that Broomel has listed 71.

All endodontic technics, according to Pucci,[30] may be grouped into five classifications:

1. Pucci, F. M. Conductos radiculares. Anatomía, patología y terapia. 2 vol. Montevideo, Uruguay. Barreiro y Ramos.

2. Ainberg, E. H. y Meshova, A. I. Obturatsia cornevij canalov bimetalicheskimi shtiftami. Stomat. Moscow 21:44, 1942.

3. Puterbaugh, P. G. Root-canal filling materials. J.A.D.A. 15:244 Feb. 1928.

4. Fisher, W. S. Some additional factors to be considered in determining the ideal type of root-filling material, with practical results. D. Cosmos 69:1252 Dec. 1927.

5. Mittleman, Gilbert. Root canal therapy: a mechanical problem. D. Items Interest 64:1089 Nov. 1942.

6. Kuttler, Y. La conservación de los dientes anteriores despulpados pormedio de la apicectomía e inmediata obturación del conducto radicular. Rev. de la Asoc. Den. Mex. 5:192 May-June 1948.

7. Jasper, E. A. Essentials in endodontic practice. Oral Surg., Oral Med. & Oral Path. 2:1199 Sept. 1949.

8. Rhein, M. L. Further consideration of some of the problems of treatment of pulpless teeth, including remarks on recent criticism by Ottolengui. J. D. Res. 3:327 Sept. 1922.

9. Walkhoff, O., and Hess, W. Lehrbuch der konservierenden Zahnheilkunde, ed. 5. Leipzig, Johann Ambrosius Barth Verlag, 1954.

10. Maisto, O. A. Towards a more rational technique for the treatment of root canals. J. Endodontia 3:2 Jan. 1948.

11. Adams, F. R. The filling of pulp canals. D. Items Interest 63:639 July 1941.

12. Conrad, W. K., and Ridgway, S. W. Possibilities of a popular root filling. D. Cosmos 76:752 July 1934.

13. Davis, W. C. Operative dentistry, ed 5. St. Louis, C. V. Mosby Co., 1945.

14. Coolidge, E. D. Clinical results in root canal treatment. D. Cosmos 69:1280 Dec. 1927.

15. Coolidge, E. D. Endodontia; the clinical pathology and treatment of the dental pulp and pulpless teeth. Philadelphia, Lea & Febiger, 1950.

16. Blayney, J. R. The clinical results of pulp treatment. J.A.D.A. 9:198 March 1922.

17. Grossman, L. I. Root canal therapy, ed. 3. Philadelphia, Lea & Febiger, 1950.

1. Diffusion technic[32-38] in which the root canals are filled with chloropercha, eucapercha, chlororesin, chlororesin-percha, paraffin and salol with paraffin with or without the addition of a solid cone.

2. Impregnation technic in which the walls of the root canals are impregnated with a strong antiseptic such as silver nitrate and the canals filled with a paste composed of zinc oxide and eugenol and gutta-percha cones.

3. Overfilling technic in which the canals are filled with absorbable materials, with or without the addition of solid cones.[9, 10] This technic frequently has been recommended in instances in which periapical destruction is present.

4. Cement technic[39-42] in which the canals are filled with a cement incorporated with silver, zinc oxide or similar materials[43] plus cones of gutta-percha, silver,[7, 44] gold,[18, 46, 47] lead,[48-51] acrylic resin[52] or indium.[53]

5. Condensation technic in which the canals are filled with silver amalgam, copper amalgam[54] or gutta-percha, with or without the aid of some cement or solvent.[14, 55-59]

THE IDEAL FILLING

The ideal root canal filling is one which thoroughly fills the dentinal portion of the canal, seals it at the cementodentinal junction and stimulates the obliteration of the cemental portion of the canal with new cementum. Such a filling will result in the formation of a healthy periapical condition, one in which the periodontal membrane and osseous tissue are normal, and in which the lamina dura is continuous around the apex of the tooth.

THE ROOT APEX

Before discussing the four terminal limits for root canal fillings and the five technics, it is necessary to present some of the latest findings regarding the tooth apex.[60, 61]

The root canal is not a uniform cone with its smallest diameter at the apex of the tooth as was formerly thought (Fig.

18. Grove, C. J. A simple standardized technique for filling root canals to the dento-cemental junction with perfect fitting impermeable materials. D. Items Interest 50:855 Nov. 1928.

19. Grove, C. J. A simple standardized technique for filling root canals to the dento-cemental junction with perfect fitting impermeable materials. J.A.D.A. 16:1594 Sept. 1929.

20. Grove, C. J. Why root canals should be filled to the dentinocemental junction. J.A.D.A. 17:293 Feb. 1930.

21. Grove, C. J. Further evidence that root-canals can be filled to the dentinocemental junction. J.A.D.A. 17:1529 Aug. 1930.

22. Grove, C. J. The value of the dentinocemental junction in pulp canal surgery. (Abst.) J. D. Res. 11:466 June 1931.

23. Grove, C. J. A rational technique for pulp-canal surgery. D. Cosmos 74:451 May 1932.

24. Hall, E. M. The mechanics of root-canal treatment. J.A.D.A. 17:88 Jan. 1930.

25. Hatton, E. H. The possibility of apical regeneration after root-canal filling from the histopathological point of view. J. Nat. D. A. 9:192 March 1922.

26. Kuttler, Y. La endodoncia científica. Rev. de la Asoc. Den. Mex., vol. 8. Enero-Febrero 1951.

27. Sharp, G. C. The historical and biological aspects of the pulpless tooth question. J.A.D.A. & D. Cosmos 24:1231 Aug. 1937.

28. Crane, A. B. A practicable root-canal technique. Obliteration of the canal. D. Cosmos 62:604 May 1920.

29. Prinz, Hermann. Filling root-canals with an improved paraffin compound. D. Cosmos 54:1021 Oct. 1912.

30. Pucci, F. M. Root-canal filling technics. Trans., World Conference on Endodontics, 1953, p. 84-88.

31. Callahan, J. R. Root-canals. D. Cosmos 51:1253 Nov. 1909.

32. Callahan, J. R. Rosin solution in root filling. Summary 34:775 Oct. 1914.

33. Johnston, H. B. The possibilities of the Callahan method. J. Nat. D. A. 8:87 Feb. 1921.

34. Johnston, H. B. Filling pulp canaliculi by diffusion. J. D. Res. 4:117 March 1922.

35. Johnston, H. B. The principle of diffusion applied to the Callahan method of pulp canal filling. D. Summary 43:743 Sept. 1923.

36. Weaver, S. M. Root canal treatment with visual evidence of histologic repair. J.A.D.A. 35:483 Oct. 1, 1947.

37. Riethmüller, R. H. The filling of root-canals with Prinz's paraffin compound. D. Cosmos 56:490 April 1914.

38. Gibbs, C. F. Salol and paraffin as a root canal filling. D. Cosmos 53:473 April 1911.

39. Buchbinder, M. A non-shrinking root-canal material. D. Cosmos 73:14 Jan. 1931.

40. Reshina, E. G. K. Voprosu plombiravania kornei tsementom. Stomat. Moscow. 21:49, 1942.

41. Rickert, U. G. Fundamentals of successful root canal treatment. J.A.D.A. 14:1657 Sept. 1927.

42. Yakubovets, O. C. Compreciivny metod plombirovania cornevii canalov suba. Stomat. Moscow 34:61, 1955.

43. Buckley, J. P. The pulpless tooth—its pathology and conservation; and a new method and technic of filling root-canals. J.A.D.A. 16:44 Jan. 1929.

44. Grossman, L. Filling root canals with silver points. D. Cosmos 78:679 July 1936.

45. Auerbach, M. B. Filling the root canals of molar teeth with silver wires. J.A.D.A. 46:270 March 1953.

1). It is divided into a long conical dentinal portion and a short funnel shaped cemental portion. The cemental portion is in the form of an inverted cone with its narrowest diameter at or near the cementodentinal junction and its base at the apical foramen (Fig. 2). "By foramen —we understand . . . the circumferential line of the root canal that forms an angle on the root surface,"[60] or it is the major circumference or border of a crater as indicated by line 4 in Figure 3. The length or depth of this funnel or the distance between the cementodentinal junction and the foramen is determined by the thickness of the cementum at this level (line 13 in Figure 3). In young people the distance averages 0.507 mm., and in older people 0.784 mm. Among older people the funnel shaped cemental portion of the canal is more pronounced. These figures are higher when measured on intraoral roentgenograms taken by standard technics and also in roentgenograms of teeth with thick apexes. This apparent discrepancy is caused by the oblique angle of the rays,[62] and is proved by an examination of roentgenograms of apicectomized teeth in which the fillings that were sealed flush with the level of the new root ending appeared to be about 0.5 mm. shorter.

In young people only about 32 per cent of the root canals end at the vertex or apical center of the root, and only 20 per cent in elderly people. In the remaining teeth, the cemental portion of the canals angle to one side as much at times as 2 or 3 mm. from the vertex; consequently, the foramen of the canal usually lies in an oblique plane as indicated by line 4 in Figure 3.

The new cementum is not deposited on the extremity of an overfilling, not even when the filling is level with the foramen[63] although Gottlieb,[64] working with dogs, reported some success. Overfilling material acts as a foreign body and provokes a defensive reaction, which results in the deposition of scar tissue that is unable to form new cementum. New cementum is found in the terminal portion of a root canal only in canals that contain somewhat short root canal fillings.

THE FOUR APICAL LIMITS

1. Overfilling is not approved because the material constitutes a foreign body,[15, 19, 64-72] and because it prevents the deposition of new cementum[26] in the cemental canal (Fig. 4, above left).

46. Grove, C. J. A new departure in root-canal practice. D. Cosmos 71:242 March 1929.

47. Grove, C. J. A simple and accurate procedure for treating and filling root canals. J.A.D.A. 17:1634 Sept. 1930.

48. Orban, B. Why root canals should be filled to the dentinocemental junction. J.A.D.A. 17:1086 June 1930.

49. Skillen, W. G. Discussion of article, "Why root canals should be filled to the dentinocemental junction," by Grove, C. J. J.A.D.A. 17:2082 Nov. 1930.

50. Buckley, J. P. The pulpless tooth—its pathology and conservation; and a new method and technique of filling root-canals. J.A.D.A. 15:2069 Nov. 1928.

51. Buckley, J. P. Technic of filling the canals of pulpless teeth with dentinoid and lead. J.A.D.A. 18: 471 March 1931.

52. Root-canal filling by an acrylic point prior to apicectomy. Brit. D. J. 96:85 Feb. 1954.

53. Pearson, H. H. Preliminary report on the use of indium as a root canal filling material. J. Endodontia 3:26 April 1948.

54. Husband, F. C. Copper amalgam as a root filling material. J.A.D.A. 15:248 Feb. 1928.

55. Coolidge, E. D. The teaching of the technic of cleaning, curetting and filling root canals. J. Nat. D. A. 5:335 April 1918.

56. Blayney, J. R. The medicinal treatment and the filling of root-canals. J.A.D.A. 15:239 Feb. 1928.

57. Gathro, F. M. The treatment and filling of root-canals. J. Nat. D. A. 9:812 Sept. 1919.

58. Noyes, E. Fifty years of root canal fillings. J.A.D.A. 9:784 Sept. 1922.

59. Woodbury, C. E. Treating and filling root canals. D. Items Interest 66:419 May 1944.

60. Kuttler, Y. Microscopic investigation of root apexes. J.A.D.A. 50:544 May 1955.

61. Blayney, J. R. The progress of pulp canal therapy. Proc. D. Centenary, 1940, p. 646.

62. Held, A. J. Traitments dentaires conserveteurs. Geneve, George Et Gil, 1951.

63. Coolidge, E. D. Root resection as a cure for chronic periapical infection: a histologic report of a case showing a complete repair. J.A.D.A. 17:239 Feb. 1930.

64. Gottlieb, B., and others. Endodontia. St. Louis, C. V. Mosby Co., 1950.

65. Buckley, J. P. A review of the literature on dental therapeutics for the past sixty years; with special emphasis on the treatment of the dental pulp and filling root canals. D. Items Interest 60:926 Oct. 1938.

66. Best, E. S. Is the overfilling of pulp canals a safe procedure? J. Nat. D. A. 6:446 May 1919.

67. Blayney, J. R. Present-day evaluation of the pulpless tooth. J.A.D.A. 23:533 April 1936.

2. Underfilling predisposes to periapical infection or reinfection (Fig. 4, above center).

3. The exact or foramenal filling rarely is such in reality, as in most instances the foramen of the tooth cannot be seen on the roentgenogram, particularly if the apex is thin. If, in the roentgenogram, the filling appears to terminate at precisely the root extremity, the canal is, in fact, underfilled. This deceiving appearance is caused by the oblique angle at which the roentgenogram is taken. Furthermore, in many instances in which the filling material seems to fill the foramen completely and in instances in which the canal seems to be straight, only one side of the terminal portion of the canal may have been enlarged or a false terminal formed. A space usually exists between the root canal filling that had reached the foramen and the terminal portion of the canal walls because of the funnel shape of the cemental canal unless the canal is overfilled with a plastic material.

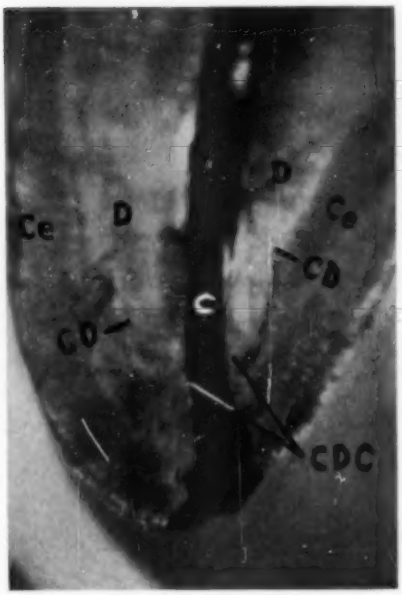

Fig. 2 • Mesiodistal section of distal root of lower third molar of 24 year old patient (magnification 40X)

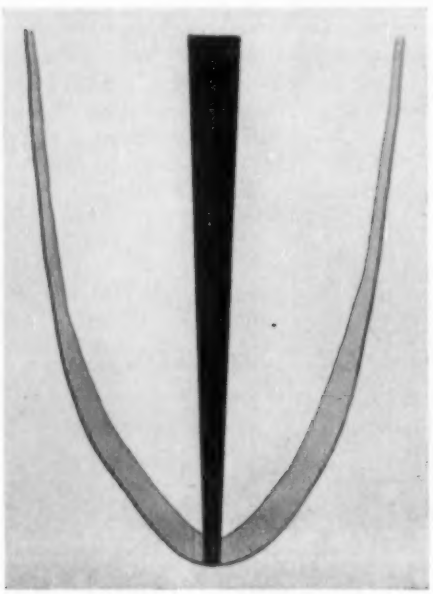

Fig. 1 • Erroneous concept of root canal apex

Until recently no satisfactory technic had been developed that would attain such accuracy. Best,[66] Blayney,[16] Cooledge[55] and Grossman[17] agree that only by chance is it possible to obturate a canal exactly and completely to the foramen. Maisto[10] states that absorbable paste is the most satisfactory root canal filling material as overfilling cannot be prevented with nonabsorbable materials.

Grove[18-23, 47-49, 73] was the first to advise that canals be filled to the cementodentinal junction. He did not explain, however, where this junction is located, and no one has been able to follow his technic.

It is now known[60] that this junction, on the average, is located a little more than 0.5 mm. from the foramen. This distance is slightly greater in the teeth of aged people. Furthermore, this dis-

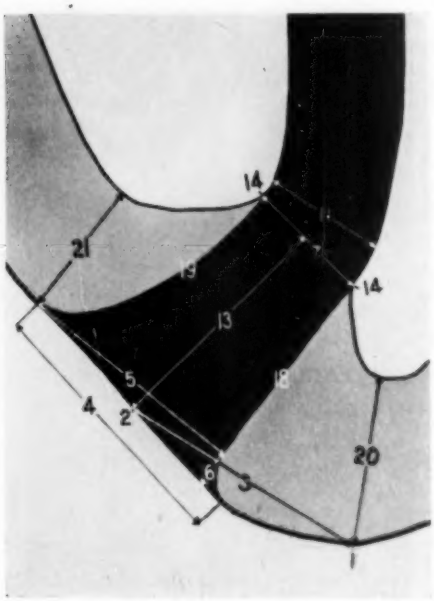

Fig. 3 • Schematic drawing of terminal ending of root canal. 1. Apical center. 2. Center of foramen. 3. Distance between apical center and center of foramen. 4. Diameter of foramen. 5. Diameter of foramen-canal perpendicular to axis of canal. 6. Unevenness of two diameters. 7. Diameter of canal at height of two even apical cementodentinal-canal union points. 11. Place of minor diameter of canal (42 per cent). 13. Distance between center of foramen and minor diameter of canal. 14. Union points of cementum, dentin and canal. 18. Cementum of right side of canal (note thickness). 19. Cementum of left side of canal (note thickness). 20. Cementum of right side at point at which it thins rapidly. 21. Cementum of left side at point at which it thins rapidly

tance registers greater in roentgenograms taken at an oblique angle, particularly if taken of teeth with thick apexes.

MAIN OBJECTIONS TO THE TECHNICS

1. The principal objection to the diffusion technics lies in the contraction[74] of the diffusible material employed. Furthermore, they frequently result in overfilling.

2. One of the main objections to the impregnation technics is the danger of causing intense periapical irritation. Also there is the possibility of darkening the teeth and the probability of overfilling.

3. The principal objection to using the overfilling technics with absorbable paste lies in the absorption of the material inside the canal.

These three groups of technics are seldom used at present.

4. The weakness found in the fourth method lies in the difficulty of terminating the filling at the desired point. This difficulty is caused by the fact that when a rigid cone is inserted in a canal filled with a plastic filling, the following may occur: (1) the cone pushes the plastic material beyond the foramen (Fig. 4, above left), (2) the cone does not carry the plastic material to the terminus of the canal which results in an unfilled space between the cone and the canal wall (Fig. 4, above right), (3) both the cone and the plastic material fail to fill the canal in its entirety, and (4) even in those instances in which both the cone and the plastic material[75] are inserted to and terminated at the foramen, absorption of the plastic material around the terminal portion of the cone may occur (Fig. 4, below left and center).

5. The main drawback to the condensation technic is overfilling. In con-

68. Blayney, J. R. The biologic aspect of root-canal therapy. D. Items Interest 49:681 Sept. 1927.

69. Blayney, J. R. Tissue reaction in the apical region to known types of treatment. J. D. Res. 9:221 April 1929.

70. Boyle, P. E. Kronfeld's Histopathology of the teeth and their surrounding structures, ed. 3. Philadelphia, Lea & Febiger, 1949.

71. Hopewell-Smith, Arthur. The histologic characteristics of the periapical tissue with regard to root-canal treatment. J.A.D.A. 15:54 Jan. 1928.

72. Amadeo, E. M. Tolerancia del paradencio apical en las sobre-obturaciones del conducto radicular. Rev. A. Odont. Argentina 40:229 June 1952.

73. Grove, C. J. Why root canals should be filled to the denticemental junction. J.A.D.A. 18:314 Feb. 1931.

74. Price, W. A. Report of laboratory investigations on the physical properties of root filling materials and the efficiency of root fillings for blocking infection from sterile tooth structures. J.A.D.A. 5:1260 Dec. 1918.

75. Stewart, G. G. Importance of chemomechanical preparation of the root canal. Oral Surg., Oral Med. & Oral Path. 8:993 Sept. 1955.

densing the filling material by pressure it is difficult to prevent it from being expressed beyond the foramen (Fig. 4, below right).[75]

Many operators who have used these five technics have found it necessary to resort to apicectomy or periapical curettage to correct the defects in their fillings.

Fig. 4 • Unsatisfactory root canal filling. Above left: Overfilling. Above center: Underfilling. Above right: Plastic filling material does not reach terminal portion of canal. Below left: Filling to foramen. Below center: Absorption of silver cement at termir al portion of canal. Below right: Overfilling with gutta-percha cones

Undeniably some good results have been achieved by the use of these methods. Hall[76] states, "Hundreds of methods and materials have been tried and some good results obtained (depending largely upon the care and skill of the operator), but the vast majority of general dentists could not depend upon these results." Grossman[77] writes,

> Although we have made considerable progress in recent years in the field of root canal sterilization, no real improvement has come forth with regard to the filling of root canals, either in the materials used or the method itself.

PROPOSED TECHNIC

It is now known that the cemental portion of a root canal is funnel shaped, that it is approximately 0.5 mm. in length, and that it usually deviates to one side, ending in an oblique and wide foramen. Therefore, it is frequently impossible to enlarge this portion of the canal properly.

Grove,[78] Blayney[68] and Fischer[79] report a difference between the soft tissues in the dentinal portion and the cemental portion of the canal. It can be considered, therefore, that the dental pulp actually begins at the cementodentinal junction.

In Moffitt's opinion[80] a root canal filling "is in reality an artificial pulp" and for that reason it should occupy the cementodentinal junction.

The periodontal membrane that remains in the cemental portion of the canal after the pulp has been extirpated is physiologically capable of producing new cementum. If an overfilling exists, however, the periapical tissue can never be normally and thoroughly regenerated. If the root canal filling is somewhat short, the regenerated periodontal membrane is capable of invaginating the canal. Only a healthy periodontal membrane can contain cementoblasts; membrane irritated by overfilling of the canals cannot. Root canal cementum cannot harbor bacteria. Sealing of the apical opening by new cementum is an ideal that only can be achieved in those instances in which the canal is slightly underfilled. Roentgenographic and clinical observations indicate that dentinal shavings implanted in the terminal portion of the canal stimulate a more rapid periapical regeneration.

For the reasons just cited it is believed that the root canal filling should terminate at the cementodentinal junction in all instances. This junction is approximately 0.5 mm. from the apical foramen in the teeth of young people and approximately 0.75 mm. in the aged. In roentgenograms taken at an oblique angle, and particularly if taken of teeth with heavy apexes, the terminus of the filling would appear to be 1.0 mm. from the root extremity. It is believed further that it is useless and harmful to insert the filling beyond the cementodentinal junction. Finally periapical regeneration and new cementum formation can be accelerated by the deposition of autogenous dentinal shavings at the cementodentinal junction or in the cemental portion of the canal.

DESCRIPTION OF TECHNIC

The canal should be explored with a blunt probe to prevent the formation of steps, as advised by Davis,[13] and to determine its length.[81] Unfortunately the form and dimensions of endodontic instruments are so poorly standardized that it is difficult to make recommendations

76. Hall, J. O. Technic for filling root canals. Texas D. J. 60:337 Sept. 1942.

77. Grossman, L. Some problems in endodontics. Trans. World Conference on Endodontics, 1953, p. 1-2.

78. Grove, C. J. Nature's method of making perfect root fillings following pulp removal, with a brief consideration of the development of secondary cementum. D. Cosmos 63:968 Oct. 1921.

79. Fischer, G. Biologie der Pulpa des menschlichen Zahnes. Johann Ambrosius Barth Verlag, Leipzig, 1955.

80. Moffitt, J. J. A method of filling root canals of pulpless teeth. D. Cosmos 74:561 June 1932.

81. Ingle, J. I. Need for endodontic instrument standardization. Oral Surg., Oral Med. & Oral Path. 8:1211 Nov. 1955.

regarding them. Ingle[81] recently made a study of this problem by measuring endodontic instruments with a micrometer. His observations demonstrated the chaotic condition that exists, and indicates that dental organizations should demand that manufacturers standardize such instruments.

All instruments that are to be inserted into root canals should be equipped with a depth gauge or stop so as to control the distance which the instrument can penetrate into the canal.[82] When the instrument is inserted the desired distance, the stop rests on the incisal edge or the occlusal surface of the tooth and prevents the instrument from penetrating further (Fig. 5, above center).

If the probe does not penetrate the full length of the canal, it may be that its curvature does not coincide with the curvature of the canal (Fig. 5, above left), or it may be that the probe is too thick. Once the length of the dentinal portion of the canal is determined (Fig. 5, above center), the next step is to enlarge it. The usual procedure is followed by inserting first a blunt broach smaller in diameter than that of the canal. Assuming that the length of the canal to the cementodentinal junction has been determined to be 20 mm., the depth gauge is adjusted to permit the probe to enter the canal no farther than 20 mm.

The curved canals, especially those of the posterior teeth, need the greatest amount of correction that can be made with files without sacrificing the walls of the crowns.

The smaller broaches are followed by larger ones until one is inserted that stops slightly short of the cementodentinal junction (Fig. 5, above right). As the canal is widened (Fig. 5, below left), gradually larger instruments are employed. The larger the instrument reaching the cementodentinal junction—no. 12 if possible—the wider the finished canal and the more satisfactory the filling (Fig. 5, below center and right).

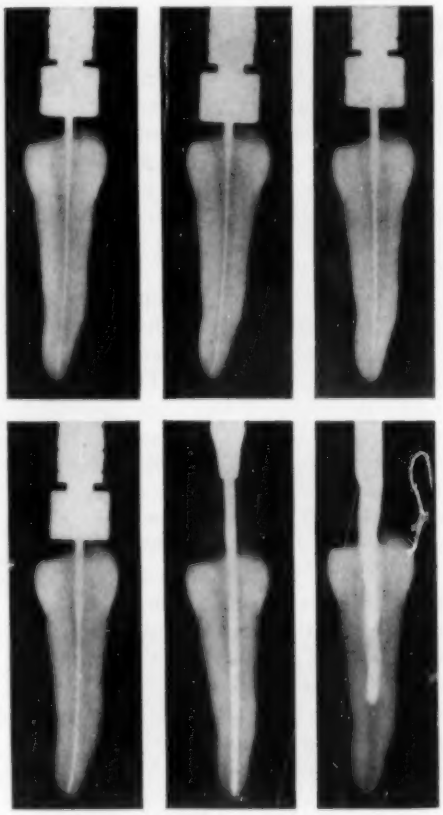

Fig. 5 • Enlarging the canal. Above left: Smooth broach reaches the curvature. Above center: Broach follows canal to cementodentinal junction. Above right: Root canal file no. 3 begins to enlarge canal. Below left: File no. 3 advanced to 0.5 mm. of foramen. Below center: Reamer no. 7 enlarges canal to cementodentinal junction. Below right: Further widening of canal with reamer no. 12

The completed canal should resemble that shown in Figure 6, top row, first and second pictures. Beginning at the cemento-dentinal junction, the conically shaped canal widens markedly for a distance of at least 1 mm. coronally. From there the gradually widening dentinal

82. Pucci, F. M. What biomechanical principles should be followed. Trans., Conference on Endodontics, 1953, p. 47.

canal will extend coronally to the floor of the pulp chamber.

Gutta-percha cones (preferably Caulk's because of their rigidity) are rolled between two glass slabs, the upper part of which has been warmed slightly. This rolling process reduces the conical shape until one end of the cone is only slightly larger than the other (Fig. 6, top row, third picture).

A cone is chosen the smaller end of which is similar in size to that of the last instrument that was inserted to the cementodentinal junction (Fig. 6, bottom row, first picture). This cone, previously disinfected, is placed on a small metallic sterile rule marked in millimeters and, in the hypothetical case discussed, is grasped at 20 mm. with sterile pliers and introduced into the canal. Should all the 20.0 mm. portion of the cone enter into the canal, the operator knows that the diameter of the inserted end of the cone is too thin. The cone should be withdrawn and a small portion cut off by means of a sterile chisel. It is measured again (20.0 mm. in this example) and inserted into the canal. This process is repeated until only 19.5 mm. of the cone enters the canal. A roentgenogram should be taken to verify that there is 1.0 mm. between the end of the gutta-percha cone and the foramen (Fig. 6, bottom row, second picture).

When the operator is satisfied that the thin end of the cone is seated properly, the cone is removed and cut off at 20 mm. at the larger end so that the finished cone is 0.5 mm. short of the cementodentinal junction and 0.5 mm. is protruding beyond the occlusal or incisal border of the tooth (Fig. 6, bottom row, third picture).

After the cone has been cut to the desired length, it should be placed in alcohol (without solvents of gutta-percha) for a while as it may have become softened during the time when the roentgenograms were taken.

Beube[83] reports quicker and better regeneration of dentin, cementum, periodontal and alveolar osseous tissue in periodontal wounds after the use of osseous powder. Others have reported the formation of calcified tissue around dentinal particles that have fallen on the stump of amputated pulps. These reports spurred the decision to implant autogenous dentinal shavings from the same canal in the last portion of the root canal to stimulate the formation of new cementum.

Walkhoff and Hess[9] report that Göllner in 1935 used dentinal filings on the stump of amputated pulps in total pulpectomies. Nygaard-Östby,[84] however, is less optimistic. He reports that "it has not been possible as yet to find any scientific evidence of an obturation of root canals by hard tissue in cases where a total necrosis of the pulp has prevailed." Nevertheless, I can report the attainment of excellent clinical results with this technic. Roentgenograms verify the fact that in those teeth in which dentinal filings were used, periapical regeneration took place more rapidly than in teeth of the same person in which filings were not used. This observation, however, still must be confirmed by histologic findings. Should such investigation confirm the roentgenographic findings, it is hoped that the technic will fulfill the aspiration of endodontists as expressed by Grossman[77] ". . . to bring about repair in a shorter period of time. . . ."

The autogenous dentinal filings are obtained by means of a rat-tail file which, like the other canal instruments, should be equipped with a stop to prevent overinsertion. The rat-tail file is passed over the wall of the widened, washed and disinfected root canal to gather the filings and to deposit them on a sterile glass plate. This process is repeated several times if necessary until a sufficient amount of filings has been collected.

83. Beube, F. E. Factors in the repair of alveolar bone and cementum. Oral Surg., Oral Med. & Oral Path. 2:379 March 1949.

84. Nygaard-Östby, B. The pathologist looks at the pulpless tooth. Trans. Conference on Endodontics. Philadelphia, Stephenson Brothers, 1953, p. 33-37.

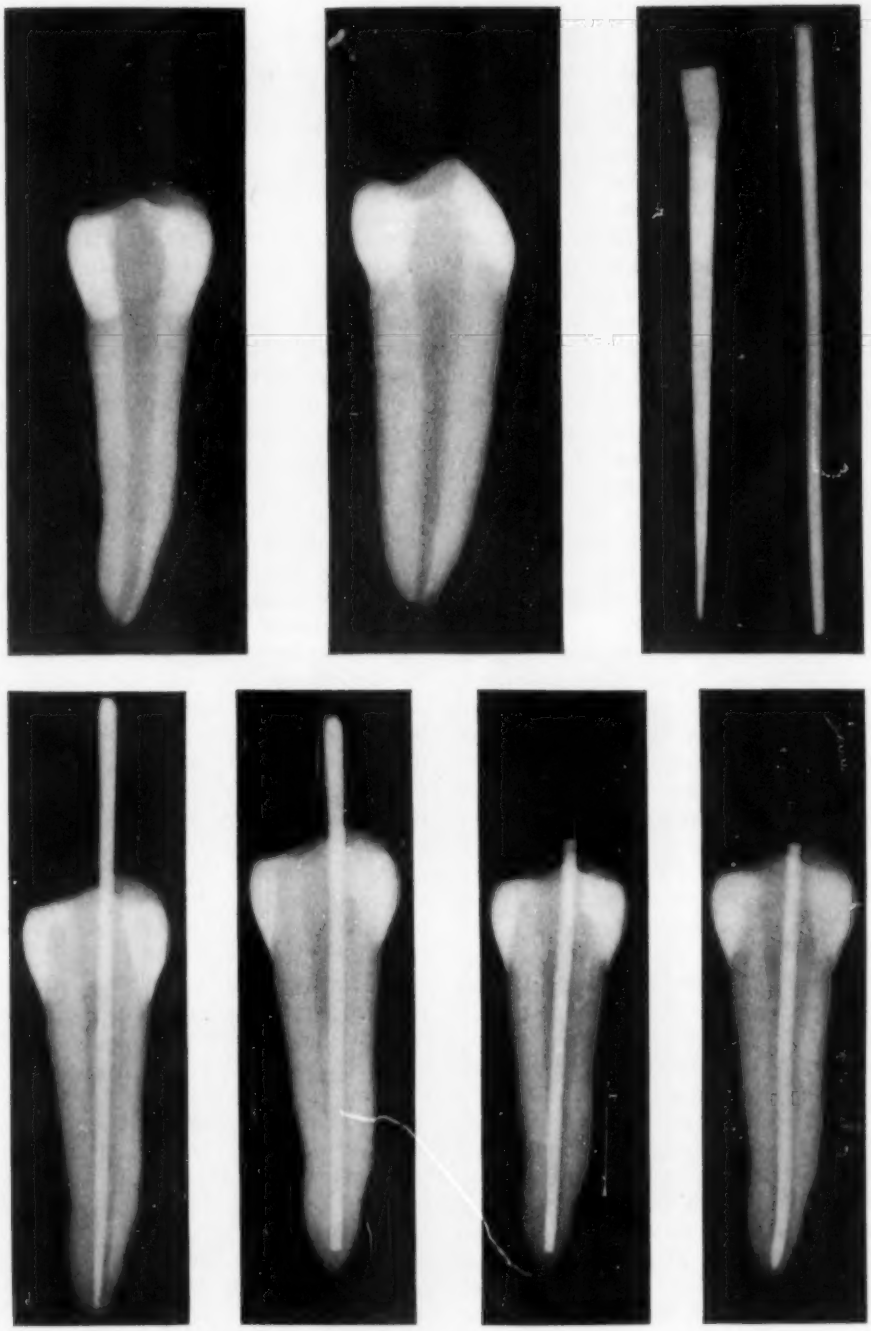

Fig. 6 • Preparation of canal for insertion of cone. Top row, first picture: labiolingual view of prepared canal; second picture: mesiodistal view of canal; third picture: prepared cone. Bottom row, first picture: cone inserted to cementodentinal junction; second picture: cone stopped within 0.5 mm. of cementodentinal junction; third picture: coronal portion of cone protruding 0.5 mm. beyond crown; fourth picture: cone sealed in place at cementodentinal junction

The heavier end of the cone is grasped with grooved dental pliers, and 0.5 mm. of the smaller end is moistened with chloroform. The moistened extremity is inserted in the small mound of filings, some of which adhere to the cone. The cone with the adhered filings is inserted into the canal and, with a slight pressure or a pumping motion, the end of the cone is advanced the 0.5 mm. required to reach the cementodentinal junction, thus sealing off the last and most important dentinal portion of the canal from the cemental portion and the extreme apex of the root. The 0.5 mm. of the heavy extremity of the cone which previously had protruded from the occlusal or incisal surface is now flush with those surfaces (Fig. 6, bottom row, fourth picture). This cone should not be removed from the canal.

With a small smooth broach equipped with the necessary stop (in the hypothetical case, it is at 19.5 mm.) (Fig. 7, above left), the operator should ascertain on which side of the cone there is more free space (Fig. 7, above center). Into this space is pumped with an acceptable root canal instrument, a thin mixture (2 drops of liquid to 1 capsule of powder) of Rickert's silver cement. Pumping should be done gently with a fine smooth broach, working the plastic material thoroughly between the cone and the walls of the canal (Fig. 7, above right). By pumping only on one side of the cone, the formation of bubbles will be lessened. Excessive pumping should be avoided.

Thin accessory cones (Fig. 7, below, first picture) are inserted in the cement around the main cone (Fig. 7, below, second picture). A heavy hot spoon is used to incise the cones at the entrance of the root canal (Fig. 7, below, third and fourth pictures). If the insertion of a pivot is planned, the cones should be incised deeper in the canal. The pulp chambers should be cleaned thoroughly and filled. It is advisable, especially when the operator is learning this technic, to take roentgenograms of each step to assure that each step of the technic has been carried out accurately.

CONCLUSION

The filling of root canals is the most important part of root canal therapy.

More than 250 materials have been investigated and 35 root canal filling technics devised, none of which has proved entirely satisfactory. This unsatisfactory condition is the result of (1) insufficient knowledge regarding the apex of teeth, (2) improper employment of materials, and (3) improper technics. Consequently, the general practitioner has not accepted endodontics with the interest and the enthusiasm that he might.

An ideal root canal filling should completely obturate the dentinal canal and result in a normal periapical region and a terminal sealing with new cementum.

To attain that ideal, a technic has been developed and is herewith reported that will obturate the root canal completely and exactly to the cementodentinal junction. The larger sized canals produced by the use of this technic assures better elimination of infected dentin and irregularities in the canal walls. The use of autogenous dentinal filings is recommended to isolate the cementodentinal termination of the root canal filling material from the periodontal membrane and to stimulate the biological closing of the cemental canal with new cementum.

The idea for this technic came to me some six years ago when roentgenograms indicated the superior endodontic results obtained in teeth in which the root canal fillings were slightly short as compared with those in which the canals were overfilled or were filled flush with the foramen.

Of 451 root canal fillings in which this technic was used, the periapical tissue in five failed to regenerate. In three teeth the cement overpassed the foramen,

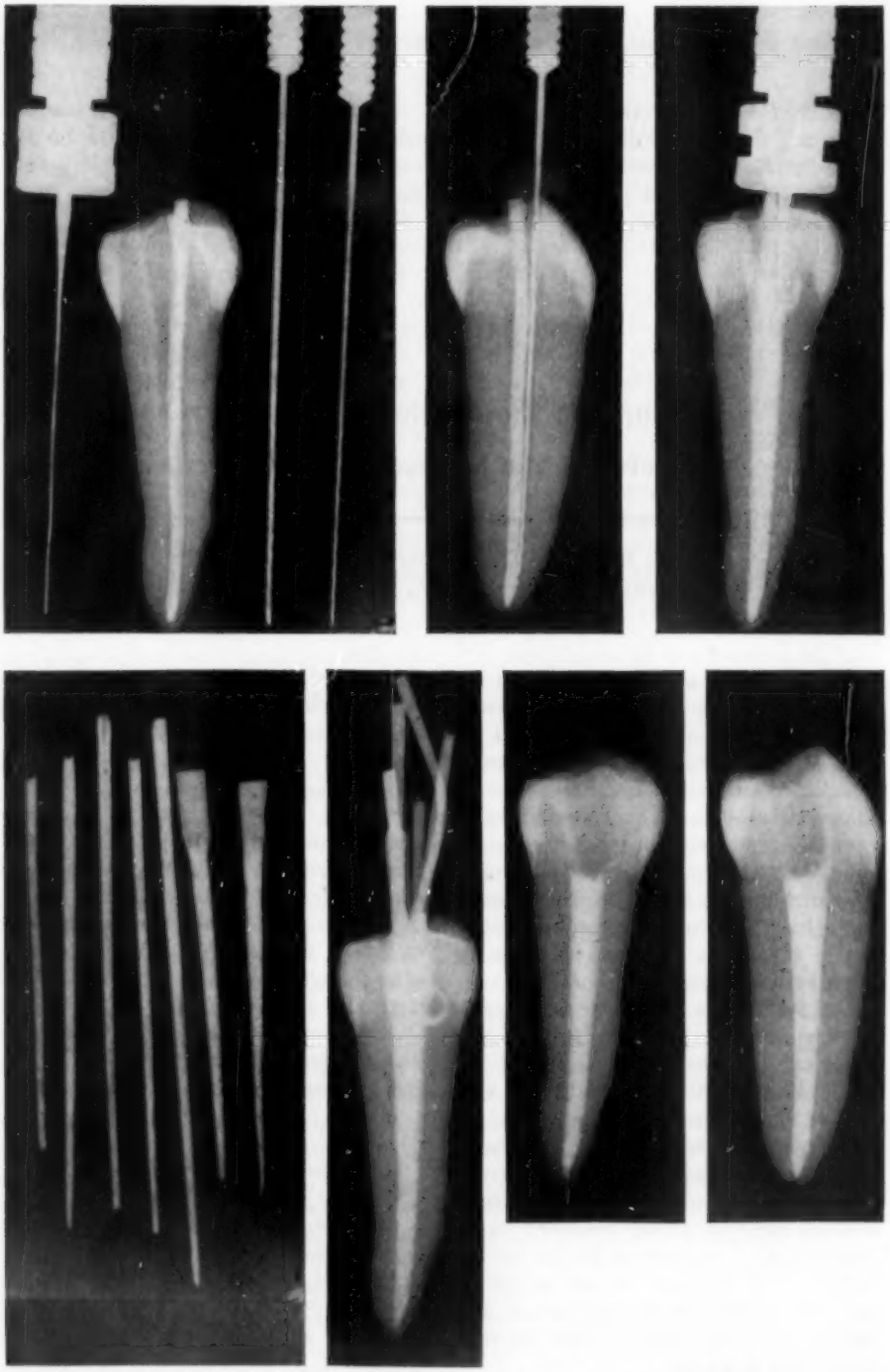

Fig. 7 • Filling the canal. Above left: Small, smooth broach and large and small Anteos root canal fillers. Above center: Small filler inserted almost to sealed portion of canal. Above right: Plastic filling material being pumped into canal with fine broach. Below, first picture: small accessory cones; second picture: accessory cones inserted around principal cone; third picture: labiolingual view of finished filling; fourth picture: mesiodistal view

probably for lack of terminal sealing. In 15 canals the cement did not reach the gutta-percha sealing or showed some air bubbles, although the periapical results were good.

This technic is so simple that students who have never previously inserted a root canal filling have mastered it immediately.

Hamburgo 250

Buffer effect of saliva stimulated between and at meals

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Controlled studies[1,2] of the relation between sugar consumption and dental caries have shown that an increased intake of sugar between meals is followed by an increase in caries activity, whereas consumption of large quantities of sugar at meals causes no change in the dental caries activity.[2-4] Lundqvist[5] demonstrated there was a considerable increase in the length of time that sugar was present in the saliva of persons consuming sugar between meals. In those who consumed it at meals only, there was no difference in the "sugar time" values when the total sugar consumption varied between 30 and 300 Gm. per day. In certain of the groups of persons studied by Lundqvist, the increase in the dental caries activity was tenfold, whereas the increase in "sugar time" was only twofold. A question arises, therefore, as to whether other deleterious factors are involved. One of these factors might be that the sugar eliminating power and buffer effect of saliva is less between meals than at meals.

The aim of the present investigation has been to study the effect of the same stimulus, acting between two ordinary meals and immediately after a main meal, on the amount of saliva produced, its buffer capacity and related properties.

MATERIALS AND METHODS

Dentists and dental nurses at the Royal Dental School in Malmö were used as study subjects.

The samples were taken between meals at 10 A.M. and about 12:30, immediately after lunch. In some persons, samples were also taken at 3 P.M. The patients were requested to chew a piece of paraffin wax for exactly five minutes and to spit the saliva thus stimulated into a bottle.

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1. Jay, P., and others. Observations on relationship of Lactobacillus acidophilus to dental caries in children during experimental feeding of candy. J.A.D.A. 23:846 May 1936.

2. Gustafsson, B. E., and others. Vipeholm dental caries study. Effect of different levels of carbohydrate intake on caries activity in 436 individuals observed for five years. Acta Odont. Scandinavica 11:232 Sept. 1954.

3. Boyd, J. D. Long term studies of dental caries progression among teen-aged inmates of a custodial institution. (Abst.) J. California D. A. 26:30 May-June (supplement) 1950.

4. Mack, P. B. A two-year study of the results of an improved dietary fed to a group of institutional boys initially superior in nutritional status. Monographs. Washington, D. C. Soc. Res. Child. Dev. 13:62, 1949.

The bottle was fitted with a stopper containing two tubes through which the patient exhaled in order to fill the space above the saliva with air of the same carbon dioxide tension as in the mouth.

In certain of the series, the stimulant was a piece of chewing gum of a Swedish make.

The amount of saliva produced in exactly five minutes was measured. For the calcium and phosphorus analyses, more saliva was needed than could be produced in five minutes; therefore, the patients had to chew paraffin or chewing gum until sufficient amounts of saliva were produced (about 10 minutes).

The buffer effect was determined by potentiometric titration of 3 ml. of saliva with 0.1 normal hydrochloric acid. The buffer effect of a sample was expressed as the amount of acid in milliequivalents per liter (mE HCl/liter) that would bring the pH down to 5.0.

The content of the total solids in the saliva was determined by filtering the saliva through a fine mesh screen and then drying it to constant weight at 90°C.

The calcium analyses were made with flame-spectrophotometry. The saliva was centrifuged for ten minutes, and 2 ml. of the supernatant was diluted with 2 ml. distilled water. The combustion was made in a butene-oxygen flame, and readings were made at 556 millimicrons. Standard solutions with known calcium content were used, and the blanks contained 30 mg. sodium per 100 ml. and 80 mg. potassium per 100 ml.; that is, the concentration of sodium and potassium in stimulated saliva.[6]

Inorganic phosphorus in the saliva was determined using the method of Fiske and Subbarow.[7] The carbon dioxide analyses were made according to Lehman.[8]

RESULTS

The buffer effect of paraffin-stimulated saliva of 15 subjects was determined immediately after an ordinary meal and between meals (Table 1).

All values measured between the meals were lower than those taken in connection with a meal (mean values 16.9 and 22.6 mE HCl/liter, respectively). The difference was statistically significant ($t = 7.3$; $P < 0.001$). The amount of saliva secreted between meals was somewhat lower than at meals, but the difference was not significant.

Table 2 shows the results of the same experiment when chewing gum was used as a stimulator. There was a statistically significant difference between the mean values of the buffer capacity ($P < 0.001$).

In this experiment there was no difference between the amount of saliva secreted at meals and that secreted between meals.

A comparison of the amount of "between meals saliva" stimulated by chewing paraffin wax and by chewing gum shows (Table 1, 2) that the amount secreted by the use of chewing gum is higher than that obtained by paraffin wax (8.0 and 6.8, respectively). Statistical analyses of the values obtained from the same subjects showed a probable difference ($t = 3.0$ and $0.01 > P > 0.001$).

The amount of total solids, calcium, phosphorus and carbon dioxide in the saliva are shown in Table 3.

Slightly lower amounts of total solids were found in the saliva between meals than at meals, but the difference was not statistically significant. It must also be stressed that large individual variations were found. For example, in 3 out of 11 tests, the amount of total solids was lower at the meals.

5. Lundqvist, C. Oral sugar clearance; its influence on dental caries activity. Lund, Gleerup, 1952.

6. Jenkins, G. N. Physiology of the mouth. Oxford, Blackwell, 1954.

7. Fiske, C. H., and Subbarow, Y. Colorimetric determination of phosphorus. J. Biol. Chem. 66:375, 1925.

8. Lehman, J. Laboratorieanalyser nödvändiga för kontroll av vätske-, salt- och proteinbehandling. Nord. Med. 21:317 Feb. 18, 1944.

Table 1 • The amount of saliva and its buffer effect after chewing paraffin wax for five minutes measured between and at meals

Patient	Amount (ml.)			Buffer effect (mE HCl/l to pH 5.0)		
	Between meals	At meals	Diff.	Between meals	At meals	Diff.
G.N.	5.5	6.0	+ 0.5	12.3	18.3	5.8
U.R.	6.0	6.5	+ 0.5	14.2	18.3	4.1
B.L.	5.0	6.0	+ 1.0	12.1	20.0	7.9
E.C.	5.0	5.0	± 0	14.3	15.7	1.4
G.J.	3.5	5.5	+ 2.0	9.5	12.2	2.7
G.K.	4.0	4.5	+ 0.5	9.2	13.7	4.5
B.A.	4.5	5.0	+ 0.5	9.3	19.0	9.7
M.B.B.	8.0	6.0	− 2.0	13.7	22.2	8.5
B.K.	5.0	6.0	+ 1.0	16.4	23.3	6.9
B.P.	4.0	14.0	+10.0	24.6	26.7	2.1
M.H.	7.0	7.0	± 0	27.2	32.2	5.0
I.S.	9.5	12.0	+ 2.5	25.4	33.9	8.5
E.L.	12.0	12.0	± 0	27.5	29.2	1.7
A.T.B.	6.5	13.0	+ 6.5	20.6	25.6	5.0
B.F.	6.0	8.0	+ 2.0	17.2	28.3	11.1
S	91.5	116.5	+25.0	253.7	338.6	84.9
M	6.1	7.8	+ 1.7	16.9	22.6	+ 5.7
m			± 0.75			± 0.78
t			2.3			7.3
P			0.05–0.02			< 0.001

Table 2 • The amount of saliva and its buffer effect after chewing gum for five minutes measured between and at meals

Patient	Amount (ml.)			Buffer effect (mE HCl/l to pH 5.0)		
	Between meals	At meals	Diff.	Between meals	At meals	Diff.
G.N.	9.0	6.5	−2.5	11.1	14.3	3.2
U.R.	8.5	7.0	−1.5	15.7	17.8	2.1
B.L.	5.0	4.0	−1.0	15.3	16.1	0.8
E.C.	6.0	6.0	±0	16.6	21.3	4.7
G.J.	8.5	7.0	−1.5	11.3	20.0	8.7
G.K.	8.5	7.5	−1.0	7.7	11.4	3.7
B.A.	6.0	7.0	+1.0	13.7	16.6	2.9
M.B.B.	8.0	6.0	−2.0	18.9	26.3	7.4
B.K.	5.0	6.0	+1.0	13.0	18.7	5.7
E.L.	11.0	7.0	−4.0	24.2	27.5	3.3
A.T.B.	14.0	14.0	±0	22.5	32.8	10.3
I.S.	11.5	11.0	−0.5	23.9	24.2	0.3
L.G.J.	11.0	11.0	±0	26.7	35.0	8.3
M.H.	5.5	8.0	+2.5	27.5	32.0	4.5
B.F.	11.0	11.0	±0	22.2	32.2	10.0
S	128.5	119.0	−9.5	270.3	346.2	75.9
M	8.5	7.9	−0.63	18.0	23.1	+ 5.1
m			±0.41			± 0.83
t			1.5			6.1
P			>0.1			< 0.001

Table 3 • The amount of total solids, calcium, phosphorus and carbon dioxide in saliva samples stimulated by chewing paraffin wax between and at meals

	Means		Difference of the means	Error of the difference	t value	P
	Between meals	At meals				
Total solids (per cent)	0.65	0.80	+0.15	±0.07	2.1	0.1>P>0.05
Ca (mg/100 ml)	3.1	2.7	−0.4	±0.4	1.0	P>0.1
P (mg/100 ml)	13.1	10.2	−2.9	±0.31	7.6	P<0.001
CO_2 (vol. per 100 ml)	20.8	29.4	+8.6	±1.77	4.9	P<0.001

The calcium values varied considerably with six samples showing higher and seven showing lower values at meals. The phosphorus values were more constant, however, and a significantly higher phosphorus value could be demonstrated in the saliva between meals than at meals (13.2 and 10.2 mg. per 100 ml. respectively; $t = 7.6$; $P < 0.001$).

The carbon dioxide analyses (Table 3) revealed significantly lower values between meals than at meals (20.8 and 29.4 volume per cent; $t = 4.9$; $P < 0.001$).

That the time of sampling between meals did not influence the results and that the results were generally valid for "between meal consumption" was shown by the following experiment. From ten subjects, samples were taken at 10 A.M., immediately after lunch at about 12:30, and then at 3 P.M. The mean values of the ten samples at the three occasions were 23.1, 29.8 and 21.3, respectively. Thus, saliva samples collected about two hours after a meal showed the same lower buffer effect as did those that were obtained two hours before.

The results may be summarized as follows. Saliva stimulated between meals showed significantly lower buffer effects, lower carbon dioxide tensions, and higher phosphorus concentrations than did saliva collected after the same stimulus in the same person at the meals. No significant differences were found in the amount of saliva secreted, the calcium concentrations and the amount of total solids.

DISCUSSION

The flow of saliva is stimulated by the sight and smell of food, which is important at ordinary meals. The stimulation by gustatory reflexes from the taste buds and by chewing is mandatory when food has been taken into the mouth. The use of paraffin wax as a stimulus, since it lacks taste and odor, might reduce the general applicability of the results. When a rich tasting chewing gum was used as a stimulus, however, the same differences in buffer values were found as when paraffin wax was used to stimulate the saliva.

It might be expected that the effect of a stimulus would be less immediately after a main meal when the salivary glands have been secreting at a high rate for a considerable time than would the same stimulus be during the resting period with slow secretion between the meals. Winsor,[9] however, observed no

9. Winsor, A. L. Effect of mental effort on the parotid secretion. Am.J.Psychol. 43:434 July 1931.

significant decrease in parotid secretion after 50 minutes of chewing.

The relation between the meals and the buffer effect of saliva was studied earlier by Forbes[10] who noted the following:

> The acid neutralizing action of saliva markedly falls half an hour or so after a breakfast or light lunch; only a slight fall follows a regular dinner of meat, vegetables, bread, dessert and coffee. Oranges, when taken alone, caused no fall in neutralizing action.

The present study demonstrated that the buffer effect of saliva stimulated at an ordinary meal is significantly higher than that of saliva secreted after the same stimulus between meals because of a higher amount of bicarbonate. Wah Leung[11] and Lilienthal[12] showed that the buffer effect of the saliva largely depended on the carbon dioxide content. The phosphate content of saliva is also of importance because of its buffer effect. It is somewhat surprising, therefore, that a lower phosphorus concentration was found in saliva stimulated at meals when the buffer effect was high. Becks and Wainwright[13] and Ericsson,[14] however, demonstrated that an increase of the saliva flow decreased the phosphorus concentration. In the present study, there was a higher amount of saliva secreted with the same stimulus at the meals than between the meals, although this difference was not statistically significant.

As the buffer effect of saliva is of importance in counteracting the acid production in the dental plaques after the ingestion of carbohydrates, the demonstrated differences between saliva produced after the same stimulus at meals and between meals may be an important factor when interpreting the studies on the relation between sugar intake and dental caries. In those studies in humans in which sugar consumption was increased at the meals,[3, 4, 2] there was no significant increase in dental caries activity; whereas such an increase was considerable when sugar was given also between the meals in the form of candy[1] even when the amount consumed was as low as 13 per cent of the total sugar intake.[2]

SUMMARY

1. Saliva collected from the same persons during five minutes of chewing paraffin wax and chewing gum at ordinary meals and between meals showed significantly higher buffer values at the meals. The amount secreted was slightly higher at the meals.

2. The volume per cent of carbon dioxide was significantly higher and the phosphorus concentration significantly lower in the saliva stimulated at the meals than in that stimulated between meals.

3. No differences were found in the amount of total solids and in the calcium concentration.

10. Forbes, J. C. Effect of meals and the chewing of paraffin and gum on the acid-neutralizing action of saliva. J. D. Res. 12:749 Oct. 1932.

11. Wah Leung, S. A demonstration of the importance of bicarbonate as a salivary buffer. J. D. Res. 30:403 June 1951.

12. Lilienthal, B. Analysis of the buffer systems in saliva. J. D. Res. 34:516 Aug. 1955.

13. Becks, H., and Wainwright, W. W. Human saliva. XI. Effect of activation on salivary calcium and phosphorus content. J. D. Res. 20:637 Dec. 1941.

14. Ericsson, Y. Enamel-apatite solubility. Stockholm, A. B. Thule, 1949.

Practical value of comparative roentgenography of the temporomandibular joint

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Edith Vályi, M.D., D.M.D., Budapest, Hungary*

A review of the dental literature published during a recent five year period gives the impression that the incidence of diseases of the temporomandibular joint is increasing. Acute rheumatoid arthritis occurs more frequently than it did previously, and, similarly, the incidence of all collagen diseases shows an upward trend. Consequently, roentgenographic examination of this region is necessarily more frequent, and the roentgenographic problems involved must be solved by the dental roentgenologist, since the general diagnostic roentgenologist has had little experience in examining this region, which is of only secondary importance in his practice.

In the experience of the Stomatologic Clinic of the University of Budapest, disorders of the temporomandibular joint seldom evolve from a systemic condition but rather from local ones, especially from defects in the functions of the masticatory apparatus. Pathological changes in the function of muscles or the teeth involved in chewing or both sooner or later will affect the temporomandibular joint.

Even without the knowledge of the patient, occlusal trauma may occur which may exceed the physiological endurance of the temporomandibular joints. Such trauma alters the direction of the condylar movement. Loss of several teeth may also cause displacement of the mandible, which affects the complicated motions and the fine structure of the joints.

Roentgenographic examination of the temporomandibular joint is important in prosthetic treatment. It is essential that the individual peculiarities of the joint be considered in the restoration of missing teeth. If the joints are not considered, the restorative work is of little value. Faulty construction of a denture may also cause damaging biomechanical changes.

Injury of the temporomandibular joints can be detected by roentgenographic examination. Some new orthodontic procedures are based on roentgenographic analysis of the joints which can aid both in diagnosis and treatment. Making differential diagnoses of ankyloses of various origins and controlling the treatment of such conditions is the concern of both the oral surgeon and the roentgenologist.

METHOD OF ROENTGENOGRAPHY

There are several well-known methods of obtaining clear roentgenograms of the temporomandibular joint, but to be of great usefulness, a roentgenographic

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method must also ensure representation of the function of the joint and the possibility of duplication of conditions, such as target-film distance, head position and kilovoltage, so that roentgenograms that are comparable may be taken at different times. The method must be precise though simple and applicable to routine work. The use of a well-established method should help the roentgenologist arrive at his diagnoses in a shorter time.

Many authors, Broadbent,[1] Lindblom,[2] Donovan,[3] Hausser,[4] Craddock,[5] Ricketts[6,7] and Updegrave,[8-10] have investigated methods of taking comparable roentgenograms of the articulation. We also reported a method, which is similar to Updegrave's method and is based on Schüller's technic.[11]

In this method which we developed, it is possible to move and change the cassette in a little box constructed for that purpose without alteration of the head position. Two phases of the joint function, when the teeth are in centric occlusion and when the mouth is open as wide as possible, are represented on a film 13 by 18 cm. in size. The rest position is considered unsuitable because gravity influences the position of the condyle and the mandible when the muscles are relaxed and the head is inclined.

New devices used in the method include two directing rods, which are fixed on the x-ray tube and not on the film box, to ensure constant distance between the target and the film and proper alignment. On the roentgenogram the shadows of the rods are superimposed on those of two calibrated comblike metal plates, which are attached to the film box. There also is a cord, attached at a right angle to the surface of the box, which regulates the head position and prevents tilting. With these devices, the roentgenogram itself gives the data necessary for the roentgenologist to reproduce the same conditions for the next roentgenogram.

Schüller's technic was modified in regard to the angle at which the central beam is directed toward the skull. In the method developed, the beam enters the skull at an angle of 60 degrees to the horizontal plane, and, therefore, it reaches the parietal bone in a more cranial direction. The target-film distance used is 60 cm.

STUDY ON ACCURACY OF RESULTS WITH METHOD

The reliability of the method was investigated by ascertaining whether the roentgenographic and anatomical findings agreed.

None of the articles on the temporomandibular joint have reported experiments of this kind. The authors usually prefer to analyze roentgenograms of patients with disorders of the articulation, and only a few authors, Amer,[12] Donovan,[3] Craddock,[5] and Martin,[13] have discussed studies on cadavers or skulls or reported measuring the condyles or the

1. Broadbent, B. Holly. A new x-ray technique and its application to orthodontia. Angle Orthodont. 1:45 April 1931.

2. Lindblom, Göste. Technique for roentgen-photographic registration of the different condyle positions in the temporomandibular joint. D. Cosmos 78:1227 Dec. 1936.

3. Donovan, R. W. Method of temporomandibular joint roentgenography for serial or multiple records. J.A.D.A. 49:401 Oct. 1954.

4. Hausser, Erich. Die Röntgenologische Darstellung des Kiefergelenkes. (Report of Speech) Deut. zahnärztl. Zschr. 5:391 April 1950.

5. Craddock, F. W. Radiography of the temporomandibular joint. J. D. Res. 32:302 June 1953.

6. Ricketts, R. M. Variations of the temporomandibular joint as revealed by cephalometric laminagraphy. Am. J. Orthodont. 36:877 Dec. 1950.

7. Ricketts, R. M. Laminagraphy in the diagnosis of temporomandibular joint disorders. J.A.D.A. 46:620 June 1953.

8. Updegrave, W. J. Improved roentgenographic technic for the temporomandibular articulation. J.A.D.A. 40:391 April 1950.

9. Updegrave, W. J. Radiography of the temporomandibular joint in orthodontics. Angle Orthodont. 21:181 Oct. 1951.

10. Updegrave, W. J. Evaluation of temporomandibular joint roentgenography. J.A.D.A. 46:408 April 1953.

11. Nitsche, H., and Vályi, E. Periodisch-identische Röntgenaufnahmen des Kiefergelenkes. Deut. Zahn Mund Kieferhk. 23:197 No. 5 and 6, 1955.

12. Amer, Ayoub. Approach to surgical diagnosis of the temporomandibular articulation through basic studies of the normal. J.A.D.A. 45:668 Dec. 1952.

13. Martin, T. B. Investigation of the position of the mandibular condyle and its interpretation from temporomandibular joint radiographs. Am. J. Orthodont. 37:277 April 1951.

angle of their longitudinal axes. The roentgenographic and anatomical viewpoints were not synthesized in these investigations, nor was the dimensional conformity of the anatomical and roentgenographic outlines investigated.

Roentgenograms of 100 skulls were taken according to the method, and the length, width and outlines of the condyles as determined from the roentgenograms were compared with the anatomical observations. Extreme points measured from the roentgenograms are shown in Figure 6, right. The method was found to give a fairly accurate roentgenographic representation of the anatomic structure. The extraordinary outlines seen on the roentgenograms were found to approximate those of the condyle.

The mean length of the longitudinal axis of the right condyle as determined from the skulls was 18.4 mm., with the shortest length being 12.7 mm. and the longest 24.9 mm. The mean length as determined from the roentgenograms was 18.6 mm., with a range of 13 to 26.3 mm. The mean anatomical length of the longitudinal axis of the left condyle was 18.4 mm., with a range of 13.4 to 23 mm.; and the mean roentgenographic length was 19.1 mm., with a range of 12.5 to 26.5 mm.

The roentgenographic and anatomical measurements of the length of the longitudinal axis were considered "identical" if the divergence was from zero to 0.5 mm. The measurements were considered "identical" in 41 of the 100 condyles, 22 right and 19 left. In nine condyles, four right and five left, the measurements varied from 0.6 to 1 mm. In a total of 32 condyles, 15 right and 17 left, the measurements varied from 1.1 to 2 mm., and the variation was from 2.1 to 3 mm. in 11 condyles, 4 right and 7 left. In seven condyles, five right and two left, the measurements varied more than 3 mm.

Thus, in 50 of the 100 condyles the roentgenographic and anatomical measurements varied 1 mm. or less, and, in 82 condyles, the measurements varied from 0.6 to 2 mm. In the remaining 18 condyles, the measurements varied from 2.1 mm. to more than 3 mm.

The differences between the roentgenographic and anatomical measurements are due to several factors. In small children and young people, the temporomandibular joint is not fully developed, and the joint is farther from the film, which produces greater distortion in the roentgenogram. Among the 100 skulls examined, there were some of youths.

There is another explanation for reduction or enlargement of the size of the condyle in a roentgenogram. The articular surface is not a straight plan, but it consists of curved sections. Parts of it are inclined both craniad and caudad. The multiplicity of the surfaces is in harmony with the many motions of the joint during mastication and speech. The inclination of the several surfaces toward or away from the central beam of the x-ray machine determines whether a reduced, enlarged or isometric roentgenographic picture will be produced when the same method is used (Fig. 1, 2).

The inclination of the surfaces, the degree of which is unknown to the roentgenologist, may also be changed in living persons by injury to the masticatory apparatus or by restorations or orthodontic appliances. To eliminate any distortion of the roentgenographic picture because of poor roentgenographic technic and, thereby, to increase the accuracy of the roentgenographic findings was the aim of the method presented.

In addition to the examination of skulls, nearly a hundred patients were examined. It was concluded from the studies of these two series that there are three types of condyles in respect to shape. The Type 1 condyle is kidney-shaped, with both ends being spheroids. Type 2 is longer and slenderer, with the middle part being slimmer than the ends. Type 3 has a spheroid-shaped lateral pole

but a sharp, pointed medial pole. This last type of condyle is usually larger than the other two types.

REPORT OF CASES

The following case reports illustrate the three types of condyles as well as some of the dental conditions and local injuries that may disturb the function of the temporomandibular joint.

Case 1 • A 55 year old man had been partially edentulous for a long time, and the centric relationship of the jaws had changed. Also, the vertical dimension had decreased. The restoration had to increase the vertical dimension to a normal level.

Figure 3 shows that the condyle was Type 3 and shows the temporomandibular joint with and without the restoration in place. With the denture in place, the lateral pole of the condyle was farther from the mandibular fossa and the articular surface was inclined more backward.

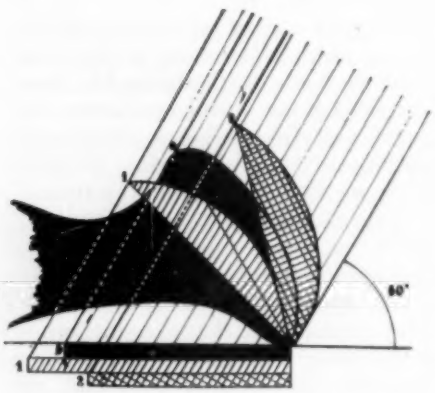


Fig. 1 • Isometric, enlarged or reduced roentgenographic picture of condyle may result even if central ray is always directed at angle of 60 degrees to horizontal plane. If articular surface slants at angle of 120 degrees to horizontal plane, picture will be isometric (0). If angle is more than 120 degrees, picture will be enlarged (1), and, if angle is less than 120 degrees, picture will be reduced (2)

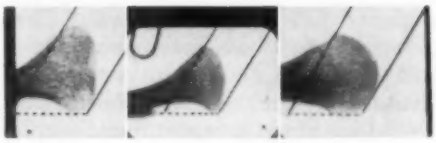


Fig. 2 • Three differently shaped condyles resting on their lateral poles, with central ray directed at angle of 60 degrees to horizontal plane

When the restoration was taken out, the condyle glided forward, and, therefore, the space between it and the fossa was wider. The lateral part of the condyle was also deeper in the fossa.

Roentgenography permitted estimation of the degree that the restoration increased the vertical dimension, and it was found to be within normal limits. Thus, the patient was spared any disorders of the temporomandibular joint that might have resulted from overburdening of the joint by overincrease of the vertical dimension.

Case 2 • A young woman had had partial restriction of the movement of the jaws two weeks previously, with the result that she could open her mouth only 18 mm. when she consulted the Stomatologic Clinic. She also complained of some vague pain in the temporomandibular joints. Roentgenograms taken according to Mayer's, Stenvers' and Schüller's technics did not aid in making the diagnosis.

Then, roentgenograms were taken of both joints according to the method presented in this paper, both with the teeth in centric occlusion and with the mouth open as wide as possible. It can be seen from Figures 4 and 5 that the condyle was Type 2. Roentgenographic examination revealed that the right temporomandibular joint was immobile and that the movement of the left condyle was restricted only by the condition of the right joint. The outlines of the bones were normal, and the presence of a tumor was excluded. Anamnesis and clinical data

indicated that the diagnosis was acute rheumatoid arthritis.

Case 3 • A 30 year old woman had severe pain, particularly at the start of mastication, and a crackling sound in the region of the temporomandibular joint. No swelling was present in the region of the articulation. Previous orthodontic treatment was reported by the patient. Only the lower first and upper third molars were missing.

Loss of a lower molar seldom causes joint disorders, but years ago the articulation also had had to adapt to the changes produced by orthodontic treatment. These two separate factors were superimposed, and the effect was manifested in joint disturbances. The roentgenograms (Fig. 6) showed that the condyle was Type 1. The space between the condyle and the articular slope was wide when the teeth were in centric occlusion (Fig. 6, left), and the condyle glided forward more than is usual when the jaws were open (Fig. 6, right). The pain was relieved by the insertion of a fixed bridge that restored the missing lower molar.

Case 4 • A patient did not attempt to open his jaws completely for a year because of pain that occurred after the extraction of the lower right third molar, with the resultant development of fibrous ankylosis, which was revealed in the roentgenogram. On the left side, movement of the joint was restricted (Fig. 7), and the right joint was immobile. The outlines of the bones in both joints were normal. The patient was operated on,

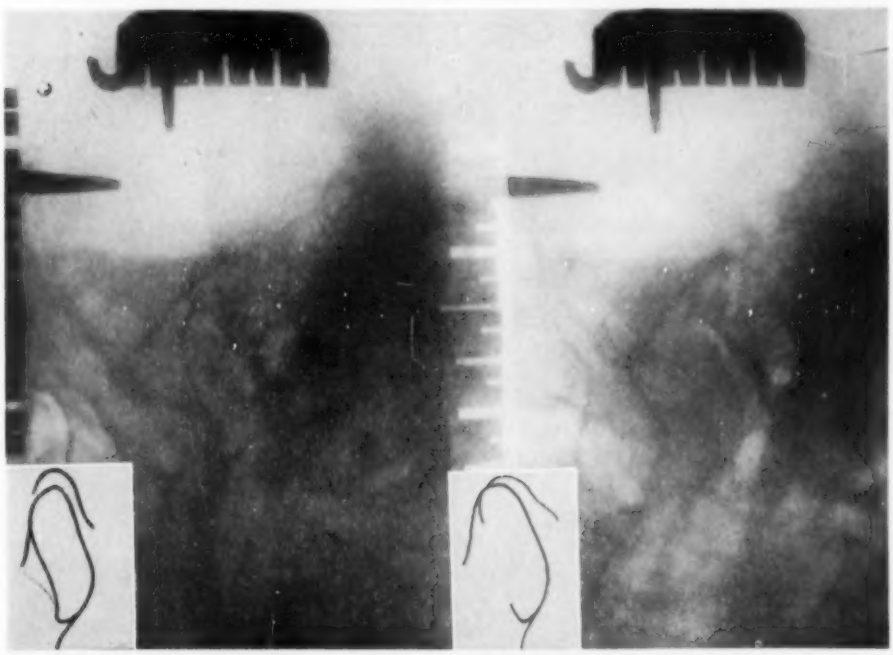


Fig. 3 (Case 1) • Roentgenographic control of restoration of vertical dimension with prosthesis. Left: With denture in place, it is noticeable that the right condyle is farther from mandibular fossa and that articular surface is inclined more backward. Right: Without denture, lateral pole of condyle is deeper in fossa. Type 3 condyle

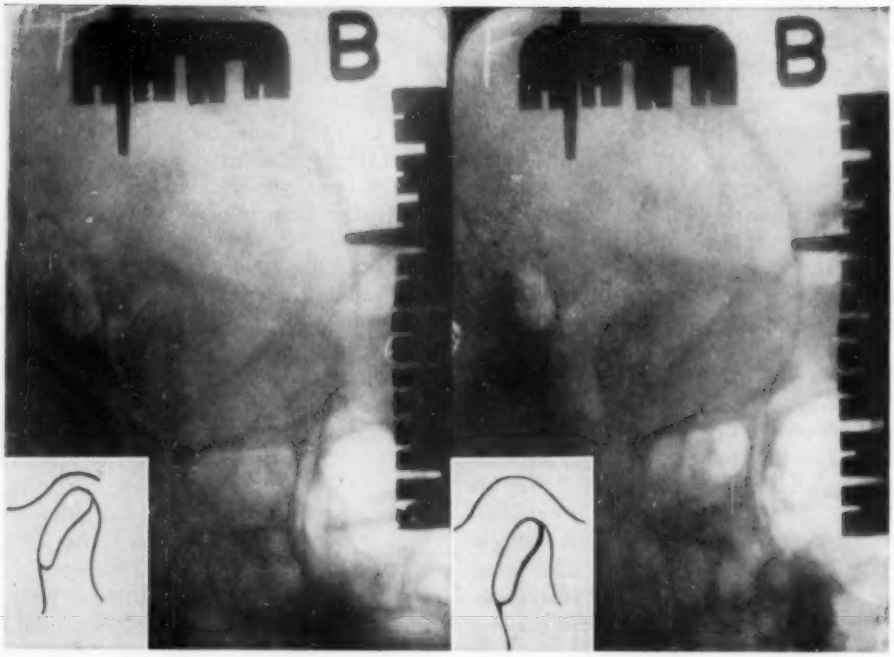


Fig. 4 (Case 2) • Left: Left condyle with teeth in centric occlusion. Right: With jaws open as wide as possible. Condyle glides moderately forward on articular eminence. Jaws of patient were partially ankylosed

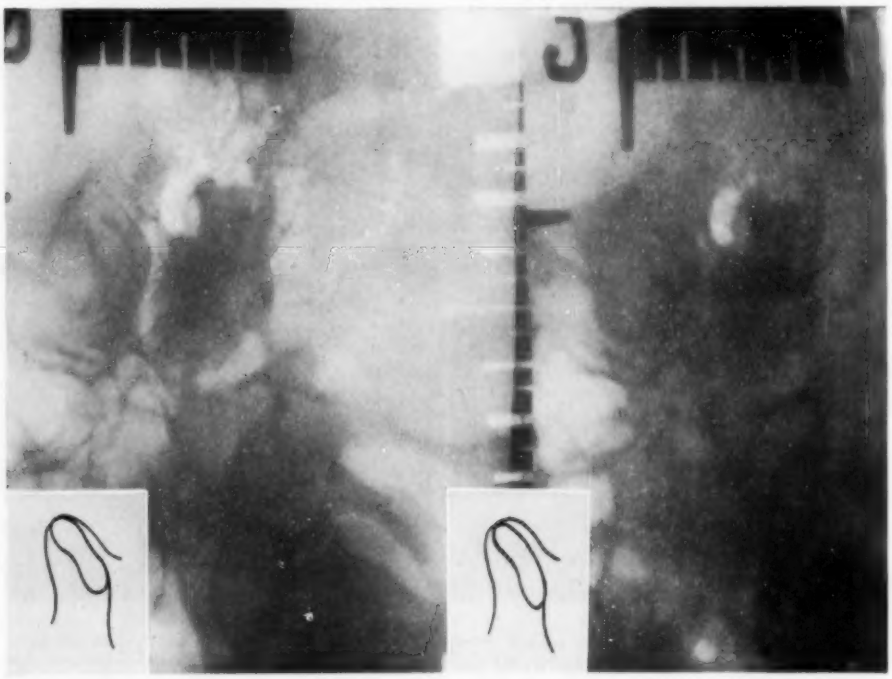


Fig. 5 (Case 2) • Left: Right condyle with teeth in centric occlusion. Right: With jaws open as wide as possible. Condyle did not move although patient opened teeth. Type 2 condyle

and a roentgenogram taken the day after the operation showed restored motion of the left joint (Fig. 7, right). The other joint needed exercise to restore full function. The roentgenographic diagnosis of the condition was found to be correct. The patient had a Type 1 condyle.

Case 5 • Figure 8 shows a condyle with an unusual beaklike contour (Type 1).

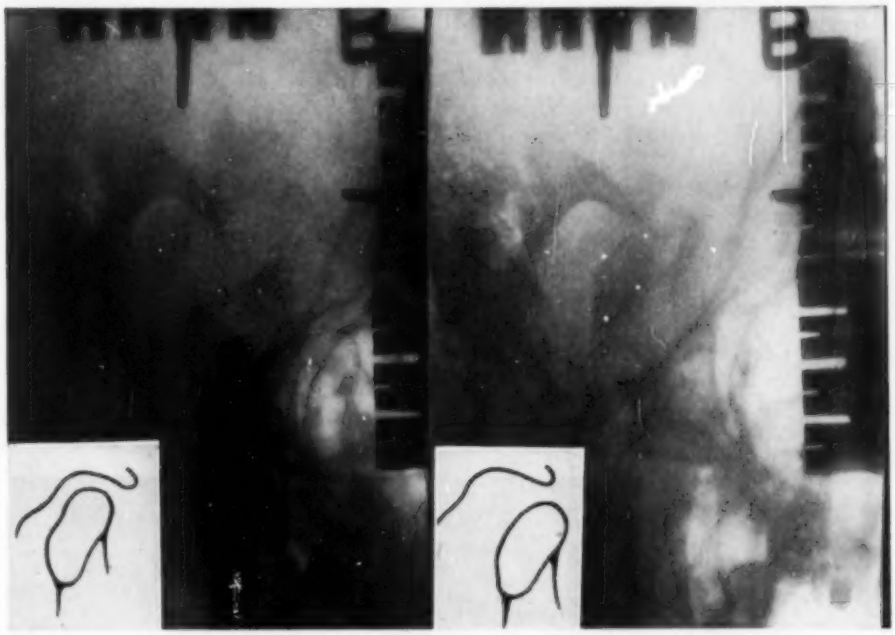


Fig. 6 (Case 3) • Left: With teeth in centric occlusion, space between condyle and fossa is wider than is usual. Right: When teeth were open, condyle glided too far forward on articular eminence. Four white dots indicate extreme points of measurement. Type 1 condyle

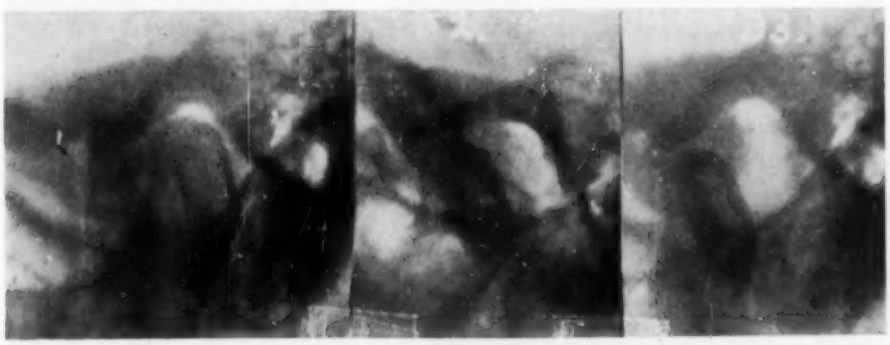


Fig. 7 (Case 4) • Motion of left condyle was restricted by fibrous ankylosis of right articulation. Left: Teeth in centric occlusion. Center: Jaws partially open. Right: Restored movement after operation was performed on right condyle. Type 1 condyle

Signs of arthritis were also visible. The roentgenograms were taken in order to test the effect of an intensifying screen, and the subject used was a nurse, who was not suspected of having any disorder. The findings, however, corresponded with the pain reported by the subject. Other joints were also affected by the disease.

Case 6 • A 47 year old man, an orchestra conductor, had tenderness of both temporomandibular joints of many years' duration. The lower left and right first molars were missing, and there was a deep vertical overbite. He also habitually pressed his jaws together both during the day and at night. It has been noticed that concentrated mental work is frequently accompanied by increased tonus of the masticatory muscles. The patient's occupation gave him no opportunity to wear removable splints. The symptoms became worse, and partial ankylosis of the jaws and pain persisted (Fig. 9, 10). A bite correction with fixed bridges, short wave therapy (6 meter wavelength) and B vitamins alleviated the condition.

COMMENT

Roentgenograms of the temporomandibular joint usually reveal that the contours of the bones are normal, but such roentgenograms may reveal some signs of functional disorders, such as the condyle's gliding too far or ankylosis of the joint. Roentgenographic and clinical examination can establish the diagnoses of many puzzling conditions.

In prosthodontics and orthodontics, precise data on the slightest changes in the condyle are needed. Whether changes

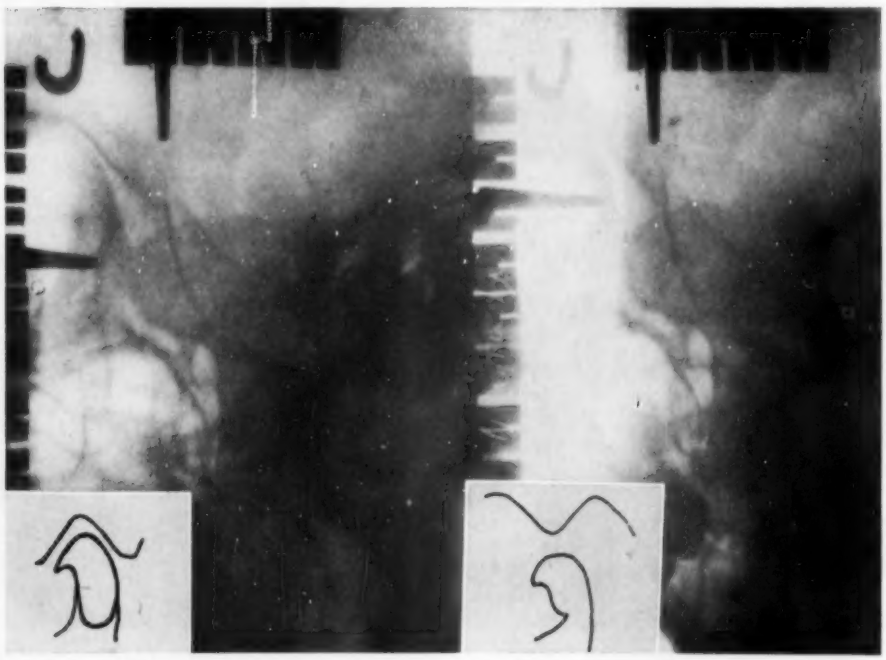


Fig. 8 (Case 5) • Beaklike bone growth on lateroanterior pole of right condyle. Left: Teeth in centric occlusion. Right: Condyle glides too far when mouth is open. Type I condyle

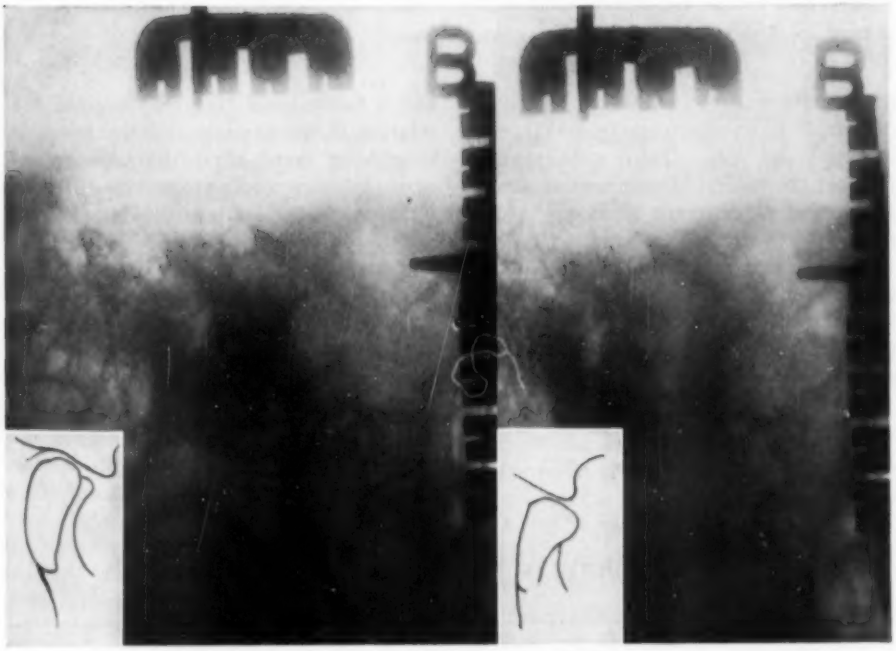


Fig. 9 (Case 6) • Left condyle is mushroom-shaped and unevenly contoured. Articular eminence is flattened. Left: With teeth in centric occlusion. Right: With jaws open as wide as possible

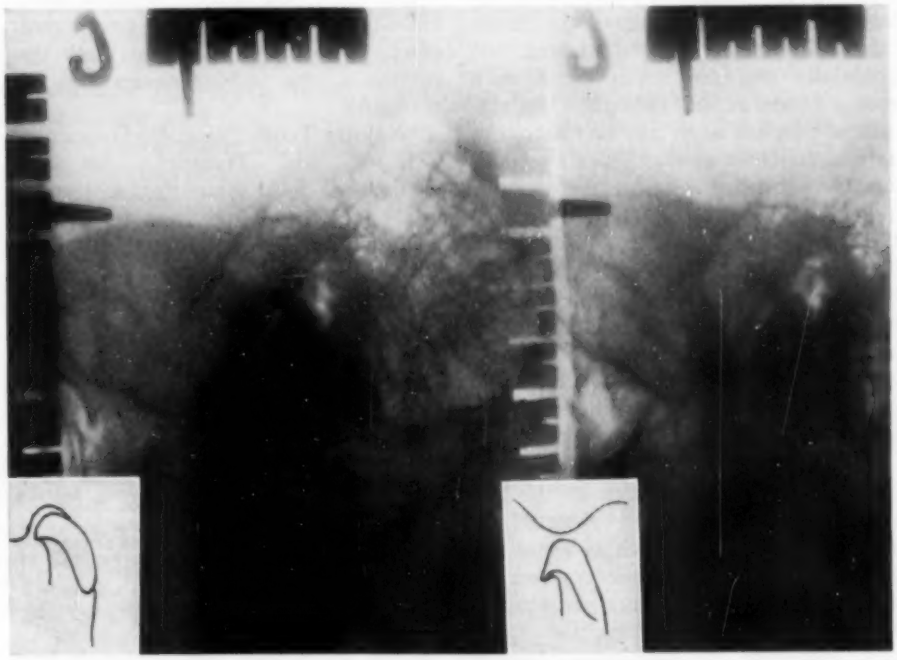


Fig. 10 (Case 6) • Right condyle shows marginal growth. Left: With teeth in centric occlusion, there was restricted space between condyle and cavity. Right: With jaws open as wide as possible

have really occurred would be difficult to determine from roentgenograms taken in a haphazard way. Technics that make possible the taking of comparable roentgenograms at different times are necessary.

It is concluded, on the basis of the investigations reported in this paper, that the method of comparable roentgenography discussed gives a good roentgenographic picture of the anatomic features and a fairly good representation of the relation of the condyle and the fossa. It should be emphasized that roentgenograms taken according to several different technics are necessary to the detection of disorders of the temporomandibular joint and are effective in this regard. The method presented will be found useful in providing new data and facilitating the differential diagnosis of disorders of the temporomandibular joint.

Bleaching of the discolored pulpless tooth

Hyman H. Pearson, D.D.S., Montreal, Quebec, Canada

By utilizing present day concepts of biological and histological factors, the dentist can avoid the need for destroying and artificially replacing tooth tissue as a means of correcting esthetics. The discolored pulpless tooth may be restored to normal function and esthetics by endodontic treatment to remove the cause of discoloration and by bleaching to remove the aberrant pigments. Various technics have been employed over the years for bleaching the discolored pulpless tooth, but, because of the lack of permanence of the restored color, bleaching was discarded as an acceptable procedure. The fault lay not with the agents but with the manner of their application.

Dental literature records many technics, some used as far back as the last century. In 1895, Garretson[1] reported the use of chloride as a bleaching agent because he says, "It is a decomposer of organic substances . . . that contain the discolored elements." Buckley,[2] Burchard[3] and Johnston[4] in 1912 and Herman Prinz[5] in 1917 reported various technics for the bleaching of the discolored tooth. Harold Maxmen[6] of Detroit gave a most complete report in 1949 on tooth discoloration, the various causes and the chemistry.

"Natural Tooth Color, Its Production, Geriatric and Traumatic Changes" would be a most interesting subject for investigation and study and for a complete treatise. Because of the topic's many ramifications, the subject of the present paper will be limited to a discussion of the

Presented before the Section on Operative Dentistry, ninety-seventh annual session, American Dental Association, Atlantic City, N. J., October 2, 1956.

1. Garretson, James E. A system of oral surgery, ed. 6. Philadelphia, J. B. Lippincott & Co., 1895, p. 231.

2. Buckley, J.P. Modern dental materia medica, pharmacology and therapeutics. Philadelphia, P. Blakiston's Son & Co., 1912, p. 336.

3. Burchard, Henry H. A text-book of dental pathology and therapeutics for students and practitioners. Based upon the original of Henry H. Burchard. Rewritten by Otto E. Inglis, ed. 4. Philadelphia, Lea & Febiger, 1912, p. 255.

4. Johnston, C.N. A text-book of operative dentistry, ed. 3. Philadelphia, P. Blakiston's Son & Co., 1912, p. 360.

5. Prinz, Herman. Dental materia medica and therapeutics. St. Louis, C. V. Mosby Co., 1917, p. 270.

6. Maxmen, Harold: Unpublished data.

bleaching of the tooth, with pulp involvement, that has become discolored.

Since the early 1920's, I have been encouraged by my patients and stimulated by a desire to restore esthetics with the least amount of tissue destruction to experiment with some of these technics. Most of the discolored teeth so treated were brought back to normal successfully, but, after a time, a secondary discoloration took place that canceled the original correction. It then became my practice to bleach only those discolored teeth that were to be covered eventually with porcelain jacket crowns. This was considered advisable in order to control the color of the finished restoration, particularly in the region of the gingival third where the porcelain is the thinnest and most translucent.

In 1941, one patient who had been so treated returned for the replacement of a fractured jacket crown. A study of the patient's records disclosed that this tooth had been bleached before the restoration was made, and, on examination, it was found that the tooth had retained its restored color after being covered for a period of eight years.

I was convinced that the source of the discoloration had been eliminated by endodontic treatment, that the aberrant pigments had been removed by bleaching and that the portals of entry into the dentin had been hermetically sealed. It was concluded that the enamel must be permeable to the oral fluids and that the appearance of a secondary discoloration was the result of pigmenting substances contained in this fluid.

On investigating further, it was discovered that this secondary discoloration took place any time between 3 and 12 months after bleaching, depending on the age of the patient and the condition of the enamel. It was also discovered that, irrespective of whether the primary aberrant pigmentation was purple, orange, brown, yellow, blue, gray or green or any combination of these, the secondary discoloration was always a bluish gray and was most pronounced in the region of the gingival third, the location of the thinnest enamel.[7]

DISCUSSION

The contents of the interprismatic spaces in enamel and the dentinal tubules is of organic composition and acts as so many wicks. The substance contained in the dentinal tubules carries pigmenting fluid from the decomposing pulp, whereas that contained in the interprismatic spaces of the enamel carries pigmenting oral fluids.

At the dentinoenamel junction, the dentinal tubules send out a mass of branches, forming a layer that is almost entirely organic. It is here that the greatest intensity of discoloration may be observed.

On re-examining the technic, it was deduced that the dentin lining the pulp chamber and cavities was satisfactorily sealed and remained so but that it was the enamel that contained the secondary discoloration. Therefore, it was concluded that not only is enamel permeable but this permeability is accentuated by the bleaching process. The secondary aberrant pigments can come from no other source than the oral fluids.

This theory of the permeability of enamel was confirmed recently by Sognnaes,[8] who said:

> Radioactive tracer studies have revealed that the enamel and dentin is permeable to various ions both from within and without, and that the radioisotope gradients observed within the enamel and dentin can be influenced by modifying the pulpal and salivary environment. . . . The relationship between the saliva and enamel is similar in kind even though not in magnitude, to that existing between connec-

7. Pearson, H.H. Successful bleaching of secondary discolourations. J. Canad. D.A. 17:200 April 1951.

8. Sognnaes, R. F. Relative significance of cellular and chemical remodeling of bones and teeth as revealed by radioactive isotopes. Presented before the annual meeting of the American Institute of Dental Medicine, October 1955.

tive tissue fluid and the other hard tissues, bone and cementum.

TYPE OF BLEACHING AGENT

A successful bleaching agent must be in a solution that has the ability to penetrate the organic matter in the dentinal tubules and the enamel interprismatic spaces without destroying the matrix of the crown. It must be of a self-limiting nature and leave no residual effects.

After the pulp is destroyed, among the functions that remain for the organic material in the hard tissues are its action as a binder of the matrix and its ability to transmit light for color control. These functions of the organic body are destroyed by the chemical action of the bleaching process and should be restored. A material must be substituted that would act as a binder, restore the translucency and, at the same time, act as a sealer of the voided dentinal tubules and the interprismatic spaces of the enamel. It must be a liquid of low surface tension that would easily penetrate the microscopic spaces and have the ability to be converted into an inert, insoluble mass.

THE BLEACHING TECHNIC

The bleaching of a pulpless tooth should be undertaken only after the health of the root and periapical tissues has been restored and the canal has been hermetically sealed.

1. The tooth is thoroughly scaled and polished.

2. A coating of petroleum jelly is applied to the labial and lingual gingival tissue investing the discolored tooth and its two approximating teeth, under the free gingival margins and in the interproximal spaces.

3. The rubber dam is punched with the smallest hole possible and is applied and held in place by means of a double winding of dental floss, double knotted under the gingiva, as far as it will go into the gingival crevice without causing trauma.

4. All filling material and decay are removed, as well as the contents of the pulp chamber. The canal is voided of its contents to a depth of 3 mm. apically to the gingival level.

5. All the exposed tooth tissue is washed with chlorinated soda solution, some of which is allowed to remain in the cavities for about one minute and then washed away with warm distilled water, and the tooth is dried. Care should be taken to wash away all vestiges of the petroleum jelly from the surface of the tooth. A mixture of one part ethyl alcohol, 95 per cent by volume, and two parts chloroform, chemically pure, is used to desiccate all the exposed enamel and dentin. This is allowed to remain in the cavities for two minutes and is aspirated using a "sealed to the tooth" aspirator tip.

6. An ether-peroxide mixture (Pyrozone) is used as the bleaching agent. A pellet of cotton is placed in the pulp chamber and the cavity and is saturated with the ether-peroxide mixture by means of a curved glass dropper. The solution is then forced into the dentin by using a pump which is composed of a soft-rubber polishing cup mounted on a porte-polisher. The cotton may be saturated several times, and the pumping may be repeated with the rim of the cup resting on the enamel beyond the cavity margins.

7. The tooth is covered with a strip of muslin or cotton dental napkin cut to fit the entire labial and lingual surfaces, and the tail end is tucked into the cavity to meet the cotton pellet that was placed in the pulp chamber. The muslin and the cotton pellet are saturated with the ether-peroxide mixture, with the muslin acting as a wick.

8. The patient's face is covered with a wet towel for protection from the rays of the bleaching lamp, a no. 2 photoflood lamp, which is held about 20 inches from the tooth. The cotton is repeatedly re-

plenished with the ether-peroxide mixture about every five minutes or as it evaporates. This process usually takes about 20 minutes.

9. The muslin strip and the remaining pellet of cotton are removed, and the cavities are dried by a blast of warm air. A dressing of 30 per cent hydrogen peroxide in water is placed in the pulp chamber, and all cavities are sealed with a white oxyphosphate of zinc cement. The oxygen from the dressing will attempt to force its way through the setting cement and will cause a leaky filling unless the cement is covered immediately with a piece of rubber dam or a plastic strip held in place by finger pressure until the cement is set. After the cement sets and just before the rubber dam is removed, the tooth is given a fresh coat of petroleum jelly to seal the enamel temporarily. Then the first treatment is completed. Three days should elapse before the second treatment.

10. At the second or subsequent sittings, the rubber dam is applied as described previously. The tooth is cleansed of petroleum jelly and other deposits by using prophylactic polishing paste; then it is washed and desiccated with the alcohol-chloroform mixture. The filling material is removed, and the bleaching process is repeated until the tooth becomes perceptibly lighter in color than is required. At the last sitting, the rubber dam must not be removed until all the dentin and enamel surfaces are hermetically sealed, as follows:

11. All the exposed enamel and dentin on the labial and lingual surfaces and the walls of the cavities and pulp chamber are painted with a self-curing acrylic resin monomer; a camel's-hair brush is used for this purpose. Several coats are applied, each after the last has been absorbed. The tooth is exposed to the photoflood lamp for five minutes. The lamp is turned off, and the brush technic is used in filling the canal and pulp chamber with a light shade of self-curing filling acrylic resin. The tooth is exposed to the photoflood lamp again for eight minutes to complete polymerization of the acrylic resin monomer as well as of the filling proper.

12. Retention points are prepared in all the cavities, which then are filled with a synthetic porcelain.

RATIONALE OF TECHNIC

The petroleum jelly is used on the soft tissue to prevent any action of the ether-peroxide mixture, which might leak inadvertently under the rubber dam. This solution will not destroy the tissue, but it will leave a painful area. Petroleum jelly is applied to the enamel before the removal of the rubber dam at the first bleaching sitting in order to seal the enamel surface temporarily. This is necessary because of the solvent quality of the ether-peroxide mixture.

The alcohol-chloroform mixture is a solvent and desiccator. These qualities are required for primary cleansing and drying.

The soft-rubber polishing cup in the porte-polisher is used as a pump instead of unvulcanized rubber and an orangewood stick inside the cavity, as originally prescribed in the earlier technics. The latter is a dangerous procedure and may result in fracturing of the crown. An excellent pumping action can be developed with the rim of the cup resting on the surface beyond the margins of the cavity.

Pyrozone is the solution used. It contains 25 per cent hydrogen peroxide in 75 per cent ether. The ether dissolves the organic matter that holds the aberrant pigments in the dentinal tubules and in the interprismatic spaces in the enamel. Besides being a solvent, the ether penetrates these spaces, carrying with it the peroxide that bleaches the pigments. The ether rapidly evaporates, leaving no moisture in the spaces.

It is the actinic rays of the photoflood light that activate the oxygen to synthe-

size the pigments, change them chemically into colorless substances and cause them to be destroyed. The heat activates the solvent qualities of the ether. Heat without light is inadequate.

The voided dentinal tubules and interprismatic spaces require refilling with an inert, translucent substance in order to restore the original qualities of light refraction and at the same time eliminate the spaces that may invite a secondary discoloration.

In most of the technics previously reported,[2-6] the use of a concentrated solution of chloral hydrate as a sealer of the dentinal tubules was suggested. No mention has been made of the need for a sealer of enamel. An 80 per cent solution of chloral hydrate is a heavy, syrupy fluid with high surface tension. It will not penetrate the tubules, and it is of no value as a sealer of enamel since it is water soluble and would be replaced by the oral fluids containing pigmenting substances.

The self-curing acrylic resin monomer was found to be an ideal preparation with the necessary qualities to fill the need for sealing the enamel. It is colorless and translucent and has extremely low surface tension, and, when polymerized, it becomes an insoluble, inert sealer. The acrylic resin monomer should be kept at a temperature below 50° F. until ready to use and should not be applied when the photoflood lamp is lit.

SUMMARY

Bleaching of the discolored pulpless tooth may be successfully performed. The secondary discoloration which may appear after a successful primary bleaching has been shown to be caused by the pigmenting substances contained in the oral fluids. Because enamel is permeable and this permeability is accentuated by the bleaching chemicals, it absorbs these substances thus changing the color.

The bleaching technic that has been presented in this paper eliminates certain causes of failure experienced in the past. The normal color of the discolored pulpless tooth can be restored and retained. The secondary discoloration that appears after a successful first bleaching is due to the permeability of the enamel. This may be prevented by hermetically sealing the enamel as well as the dentin.

500 Birks Building

Reading Efficiency • In the modern world the efficiency of a worker is commonly measured by the output of work in a given period of time. Assuming that the work is satisfactory in quality, this is a satisfactory definition of efficiency for ordinary economic purposes. However, when ease of seeing is important, as it is in all prolonged tasks of critical seeing, the over-all efficiency of the worker has been ignored, owing to a gross lack of thought and knowledge pertaining to ease of seeing.

Applying the same logic to the task of reading, it is self-evident that the rate of reading is not *a priori* a measure of the reader's efficiency. Nevertheless, it has been assumed without adequate proof, that speed of reading in words per minute or lines per hour is a suitable measure of readability. Much evidence is available to condemn this viewpoint as too narrow and the assumption as untenable.

Speed of reading is not an acceptable criterion of readability in the absence of additional evidence, and at best it is an insensitive criterion which has various limitations. ***Matthew Luckiesh and Frank K. Moss, Reading as a Visual Task, 1944.***

Dental prosthesis in the past

G. Ward, Manningham, Bradford, Yorkshire, England

Lillian Lindsay, England's gifted dental librarian, once remarked: "The introduction of mechanics into the practice of the tooth drawer was like the discovery of the uses of fire in the history of mankind."

Likewise it may be said that the introduction of vulcanite into the practice of dentistry was of equal importance in the progress of the profession. The illustration shows a reconstruction, made by the author, of an early bench and tools used in the construction of dental prostheses before the advent of vulcanite. In that era, dental prosthetics was closely related to, and often undertaken by, the silversmith and ivory carver.

The different types of dentures under construction are shown on the bench. The first, in the center at the front, is in the process of being carved from a piece of bone. Before Goodyear and Putnam, about the middle of the last century, introduced vulcanite as a practical base for dental prostheses, gold, platinum, and elephant, sea horse and hippopotamus ivory and bone were the only materials used for that purpose.

Palatal and ridge surfaces of the bone denture were obtained by fitting the plate on the plaster model of the mouth. Vermilion or rouge mixed with oil was applied to the model with a camel's-hair brush. When the bone block was placed on the model, certain portions of the block picked up coloring matter from the model, indicating where carving was to be done. Before the technic of obtaining a reproduction of the mouth in plaster of paris from a negative impression of the tissues was introduced, the gums were painted with a pigment, and the piece of bone pressed against them. Even after the introduction of plaster models, the bone plate had to be refitted in the mouth after being carved in the workroom.

The early bone dentures, like that shown on the bench, had the teeth carved in one piece from the bone itself. The bone over the ridge was roughly shaped to a block which was then separated by saw cuts into individual teeth. These teeth were then carved in detail, as shown on the reconstructed workbench.

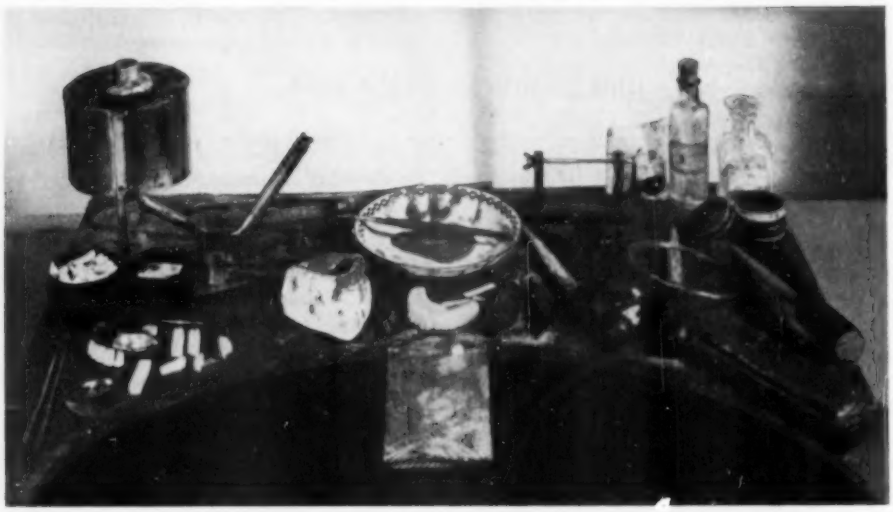
In actual practice, the fitting or palatal surface of the bone denture would have been completely carved first, but for convenience in demonstrating the methods employed, the carving of both the fitting surface of the denture and the teeth is shown being carried out at the same time.

In the later bone dentures, human anterior teeth were often riveted in sockets carved in the bone. Early porcelain teeth, after their introduction from France, may have been used in a similar manner.

On the bench near the dentures can be seen three gravers of the kind used for carving bone.

The other denture, in the left corner of the bench, has a base of swaged gold on which six human anterior teeth are being mounted with rivets of gold wire. Five of these teeth are shown in place, and the sixth, which is being prepared for attachment, is seen nearby. When human teeth were used for dentures, the crown was sawed off and the root canal enlarged to receive the rivet which was passed through the plate and secured on the fitting surface.

Bone blocks, carved to represent the



posterior teeth, were riveted on the back of metal plates. Two such blocks, one fully and the other partially carved, are to be seen beside the denture. Metalwork was originally sent to a goldsmith, but in time such work was performed in the dentist's own workroom on dies made by a brass founder. Eventually, the dies were cast and the whole process carried out in the workroom.

The round box on the left of the bench contains human teeth which were used on both bone and metal restorations. The dentists of the time did not inquire too closely into the source of such teeth, which were often purveyed by gravediggers and "resurrection men," and even collected from battlefields.

The spirit lamp at the back of the bench was used in soldering, as the early workrooms had no gas supply and all soldering had to be performed with an oil or spirit flame and the mouth blowpipe. The lamp shown had a pipe, with a cotton wick inserted in the end, leading from the spirit reservoir. The mouth blowpipe can be seen lying partly on the tray at the base of the lamp.

The small machine on the right was used for rolling spiral springs. A partially wound spring is shown on the shaft. The spiral spring, employed as an aid to retention and stability, survived the bone dentures by many years.

The springs were wound from gold wire. One end of the wire was inserted in a hole passing through the shaft at the opposite end from the handle. The other end of the wire was then secured in a hand vise, as shown, and pulled taut. When the handle was operated, the wire wound on the shaft to form the spring. When completed, the shaft was removed from the machine and the spring carefully removed from the shaft.

The "bone age" of dental prosthetics has passed, and the methods and skills of those early days are now lost among the newer and simpler technics of the present time. In a few short decades, materials and processes have been introduced into dentistry which were undreamed of by the men who worked at such benches as that shown in the illustration.

The reconstructed bench and appliances described in this article are in the collection of the museum of the Dental School of the University of Leeds.

28, Home View Terrace

Dental education in Turkey

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Turkey, a country that forms a bridge between Asia and Europe, has an area of 776,000 square kilometers and a population of 25,000,000.

The nation's first university was established in 1902, in Istanbul. Smaller universities have since been founded in Ankara and Izmir. Turkish universities, like those in Europe, have various faculties which are the equivalent of the several colleges found in universities in the United States.

Turkey's one college of dentistry, at the University of Istanbul, accepts between 70 and 80 freshmen each year, of whom between 20 and 25 are from Syria, Iran, Iraq, Cyprus, Greece and Israel.

Formerly only small numbers of Turkish students sought to enter the College of Dentistry, but in the past seven or eight years the College has attracted many applicants. Last year 700 applicants sought the 80 available places. Until five years ago, university preparatory school graduates with good or excellent grades qualified for admittance to the College of Dentistry. Since then, all applicants, except those from abroad, have had to pass entrance examinations.

Applicants to the universities must have five years of primary education and six years of secondary education. The student in any of the sciences such as medicine, pharmacology and dentistry attends the college of sciences of the university for one year, taking courses in physics, chemistry, botany and zoology. The student who passes these courses thereby earns the right to attend the college of his choice.

A dental education in Turkey requires four years of study and extension of the course is being considered. Between 50 and 60 seniors graduate each year. In 1938 Turkey had a ratio of 1 dentist to every 18,000 persons; today the ratio is 1 to 7,500. The nation needs more dentists and another dental school. A college of dentistry at the University of Ankara is contemplated.

Graduates of the College of Dentistry at Istanbul must serve in the army for 18 months, of which three months is spent at the reserve officers' school. Dentists have the rank of second lieutenant in the army, and usually serve in army hospitals.

The average income of a dentist in Turkey is rather good. Most young dentists begin practice without too much specialization. There are no state board examinations. Dentists are given the legal authority to perform such operations as apicoectomy, surgical extraction, cyst enucleation, immobilization of jaw fractures, and surgery on minor alveolar tumors. To practice major oral surgery, it is necessary to have a medical degree and to specialize at a state hospital.

Dental students acquire their general medical training in the institutes and hospitals of the Faculty of Medicine. Theoretical, laboratory and clinical

Gate to the University of Istanbul, viewed from the campus

work in dentistry is performed in the institutes, laboratories and polyclinics of the College of Dentistry.

The first two years are devoted to preclinical studies. In this period each student must learn and pass an examination in a foreign language.

The oral surgery division of the College of Dentistry has many patients, and each dental student can perform four or five extractions daily. Each student must perform at least one minor oral surgery operation, such as alveolectomy, apicoectomy, extraction, and cyst resection.

In the preclinical courses, dental students work on "phantoms"—iron skulls with drillable teeth in their jaws—which can be mounted easily in dental chairs.

The only approved dental specialty in Turkey is orthodontics, which requires two additional years of study. Turkish dentists may prescribe any drug related to dentistry. Almost all dentists are members of the Turkish Dental Association.

The nation needs more dentists. Although Turkey's one dental college is favorably known, postgraduate instruction is inadequate and dental research is insufficient. It is hoped these deficiencies will be overcome in the near future.

1700 cadde no. 146

Transitoriness in Man • What I believe, what I value most, is transitoriness. But is not transitoriness—the perishableness of life—something very sad? No! It is the very soul of existence. It imparts value, dignity and interest to life. It creates time—and "time is the essence." Potentially at least, time is the supreme, most useful gift.

Time is related to—yes, identical with—everything creative and active, every progress toward a higher goal.

Without transitoriness, without beginning or end, birth or death, there is no time, either. Timeliness—in the sense of time never ending, never beginning—is a stagnant nothing. It is absolutely uninteresting.

Life is possessed by a tremendous tenacity. Even so its presence remains conditional, and as it had a beginning, so it will have an end. Life, just for this reason, is exceedingly enhanced in value, in charm.

One of the most important characteristics distinguishing man from all other forms of nature is his knowledge of beginning and end, and, therefore, of the gift of time.

Man is meant as a great experiment, and the possible failure caused by man's own guilt would be paramount to the failure of creation itself.

Whether this belief be true or not, man would be well advised if he behaves as though it were. *Thomas Mann. Life Grows in the Soil of Time.*

Dental house staffs at civilian hospitals, 1950-56

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Heretofore, the formal education of a dentist was usually completed after four years of undergraduate professional training. Within the relatively recent past, however, increasing emphasis has been placed on postgraduate and graduate dental education. Today, almost 400 dentists annually accept internship or residency training positions in hospitals. This does not include those taking training in hospitals operated by the Department of Defense or the Public Health Service.

Through these advanced educational programs in hospitals, dentists have the opportunity of acquiring clinical experience and of developing specialized knowledge before entering dental practice. They, in turn, help to staff the outpatient clinics. Together with the medical and surgical staffs, they have the opportunity to learn the value of teamwork in the treatment of certain difficult cases.

The Council on Dental Education has been delegated by the American Dental Association with the responsibility of evaluating the advanced dental education programs in hospitals and for listing as approved the programs which are conducted in accordance with the requirements approved by the Association's House of Delegates. By September 1, 1957, the Council had granted approvals to 190 hospitals. Included in this number are 11 Navy, 8 Army, 8 U. S. Public Health Service, and 19 Veterans Administration hospitals.

The Korean War created an immediate and urgent need for additional medical and dental officers for the Armed Forces. In order to provide them, Congress passed Public Law 779, the "Doctor-Draft Act." Among other provisions, this law specified order of call by designating four different priority groups. Priorities 1 and 2 consisted of physicians and dentists who were permitted to continue their education during World War II. Priority 3 included those who had neither deferment nor military service, and Priority 4 consisted of veterans.

The Health Resources Advisory Committee of the Office of Defense Mobilization has collected data on internships and residencies in nonfederal and V.A. hospitals each year since 1950 when the "doctor-draft" law first became effective. (The Health Resources Advisory Committee also serves as the National Advisory Committee to the Selective Service System.) In scope, the surveys are threefold; they are designed to show: (1) normal or existing staffing levels which could serve as guides in mobilization planning; (2) the extent of losses due to

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military withdrawals under the "doctor-draft" law, and (3) the development of trends in hospital house staffing. Respondents were limited to those non-federal and Veterans Administration hospitals which had approved programs for graduate medical education. These hospitals were requested to list dental as well as medical interns and residents in training.

Some of the observations made in those surveys are presented in the following paragraphs. They differ in some respects from the data of the American Dental Association. Their data relate to total approved dental positions in federal and

Table 1 • Number of alien and citizen dental house staff members at hospitals (excluding Department of Defense and Public Health Service hospitals), by state and territory for 1950–51 and 1956–57 training years

State and territory	Total dental house staff		Citizen dental house staff		Alien dental house staff	
	1950–51 training year	1956–57 training year	1950–51 training year	1956–57 training year	1950–51 training year	1956–57 training year
Total	316	398	289	338	27	60
Ala.	2	7	2	5	0	2
Calif.	16	9	16	7	0	2
Conn.	5	8	5	4	0	4
Del.	2	6	2	3	0	3
D.C.	10	12	10	10	0	2
Fla.	1	2	1	2	0	0
Ga.	2	4	2	4	0	0
Ill.	16	18	9	10	7	8
Ind.	4	7	4	7	0	0
Iowa	2	6	2	6	0	0
Kans.	1	1	1	1	0	0
Ky.	1	3	1	3	0	0
La.	3	9	3	9	0	0
Me.	3	0	3	0	0	0
Md.	11	15	10	11	1	4
Mass.	14	15	14	12	0	3
Mich.	10	12	9	12	1	0
Minn.	7	14	7	13	0	1
Mo.	7	0	7	0	0	0
Mont.	0	11	0	10	0	1
Neb.	1	0	1	0	0	0
N.J.	27	11	22	11	5	0
N.Y.	104	128	97	118	7	10
N.C.	2	7	1	5	1	2
Ohio	17	20	17	20	0	0
Okla.	1	2	1	2	0	0
Ore.	3	0	3	0	0	0
Pa.	22	36	18	22	4	14
R.I.	0	1	0	1	0	0
S.C.	1	0	1	0	0	0
Tenn.	5	2	5	2	0	0
Texas	8	15	8	12	0	3
Vt.	2	0	2	0	0	0
Va.	1	4	1	4	0	0
Wash.	2	1	1	1	1	0
W. Va.	1	2	1	1	0	1
Wis.	1	10	1	10	0	0
Hawaii	1	0	1	0	0	0

Source: Reports from hospitals to Health Resources Advisory Committee, Office of Defense Mobilization.

Table 2 • Increase or decrease since 1950 in the number of dental house staff members training in hospitals (excluding Department of Defense and Public Health Service hospitals)

Training year	Total dental house staff		Citizen dental house staff		Alien dental house staff	
	Number	% increase or decrease	Number	% increase or decrease	Number	% increase or decrease
1950–51	316	—	289	—	27	—
1951–52	319	+ 0.9	285	− 1.4	34	+ 25.9
1952–53	364	+15.2	317	+ 9.7	47	+ 74.1
1953–54	383	+21.2	343	+18.7	40	+ 48.1
1954–55	401	+26.9	356	+23.2	45	+ 66.7
1955–56	408	+29.1	349	+20.8	59	+118.5
1956–57	398	+25.9	338	+17.0	60	+122.2

Source: Reports from hospitals to Health Resources Advisory Committee, Office of Defense Mobilization.

nonfederal hospitals, whereas the Committee studies refer to total filled dental positions reported by nonfederal and V.A. hospitals which have approved programs for graduate medical education but which may or may not have approved dental training programs.

DENTAL HOUSE STAFFS 1956-57

For 1956-57, 398 dental interns and residents were reported in training at 174 hospitals in 29 states and the District of Columbia. About three fifths of the dental house staff members were located in six states: New York, New Jersey, Pennsylvania, Massachusetts, Ohio and California. More than 30 per cent of them were located in New York State (Table 1).

Of dentists in training, 84 per cent held appointments at general hospitals; 9 per cent were in mental hospitals and the remaining 7 per cent were in tuberculosis and other special hospitals. A close examination of the data shows that more than three fifths of the dentists are concentrated in hospitals having 500 or more beds.

SIX YEAR TRENDS

In 1950, before the mobilization of dentists and physicians got under way, hospitals reported 316 dental interns and residents in training. In 1951, in spite of extensive withdrawals under the "doctor-draft" law, the number on dental house staffs was about the same. In each of the five subsequent years (1952-1956), dental house staff totals showed a considerable increase over the 1950 level—15 per cent in 1952; 21 per cent in 1953; 27 per cent in 1954; 29 per cent in 1955; and 26 per cent in 1956. These increases are reflections of increases both in number of dental school graduates and in number of alien dentists taking training in this country.

CITIZENSHIP STATUS

Although a comparison of 1956-57 data with those of 1950-51, shows an over-all increase of 26 per cent in dental house staff members, a slightly different picture is seen when the data for citizens and aliens are viewed separately (Table 2). Over the six year period, the citizen group showed a 17 per cent increase—338 as compared with 289, whereas the alien group increased 122 per cent, from 27 to 60.

A hospital-by-hospital examination of the data for 1956 shows that 53 per cent of the hospitals had two or more dental house staff members, the largest having 13 members, whereas 47 per cent of the

Table 3 • Distribution by military liability of dentists training in hospitals (excluding Department of Defense and Public Health Service hospitals) for the 1956–57 training year

Military liability	Total dental house staff	
	Number	Per cent
Total	398	100.0
Citizen registrants and commissioned house staff	322	80.9
Priority I	0	—
Priority II	0	—
Priority III	97	24.4
Priority IV	209	52.5
Priority unknown	16	4.0
Total aliens	60	15.1
Male	48	12.1
Female	12	3.0
Civilian intern program	1	0.3
Female citizens	5	1.2
Over-age male citizens	10	2.5

Source: Reports from hospitals to Health Resources Advisory Committee, Office of Defense Mobilization.

hospitals had only one intern or resident. Military withdrawals at the latter hospitals are naturally more disruptive to the provision of civilian health services.

Although interns and residents were not identified separately in the survey, it was evident from year of graduation information that more than one third of the staff members were taking intern training. Graduates of the class of 1956 accounted for 140, or 35 per cent of the total.

As indicated by year of graduation data, most dental interns and residents were in the younger age groups. The youngest house staff member was 22 years old, 15 per cent were under 26 years of age, 53 per cent were between 26 and 30 years of age, and the remaining 32 per cent were 31 years of age or older. The median age for dental house staff members was 29.

In 1956, alien dentists in training on hospital house staffs represented about 15 per cent of the total members, noticeably less than for medical house staffs where alien physicians accounted for more than 29 per cent of the total. In 1950, alien dentists accounted for 8 per cent of the total dentists, and alien physicians accounted for 8 per cent of the total physicians. Two fifths of aliens on dental house staffs were located in two states, New York and Pennsylvania.

In both 1950 and 1951, 90 per cent or more of the total dental house staff were registrants under the "doctor-draft" law or were members of reserve components of the Armed Forces who were potentially liable for active military duty. In 1956 (Table 3), 81 per cent of the total dental staff were registrants or reserves potentially liable for military service. The remaining 19 per cent were not liable for active duty and included alien, female and over-age dentists. Of these potentially liable in 1956, 97 or 24 per cent were in Priorities I, II and III, the groups now being called for military service, and Priority IV registrants (veterans) numbered 209 or 52 per cent of the total. Six years earlier Priorities I, II and III dentists accounted for 33 per cent of the total and Priority IV accounted for 35 per cent of the total.

FUTURE OUTLOOK

An increase in the number of dental interns and residents is anticipated for the years ahead. Dental school enrollments are at record levels. Several new schools have gone into operation in the past few years and others are currently in the planning stage. The number of dental school graduates has risen from 2,800 in 1950 to 3,000 today. It now appears fairly certain that graduates will reach 3,400 by 1960.

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Transplantation of teeth: clinical and experimental studies

Chester C. Fong, D.D.S., and R. Gordon Agnew,† D.D.S., M.Sc. (Dent.), Ph.D., San Francisco*

The modern history of tooth transplantation as reflected in the dental literature is not voluminous and covers approximately 15 years. Valuable contributions have been made by American investigators. The pioneer studies by Apfel[1,2] convincingly demonstrated the practicability of this operation. Through his experience with clinical autogenous transplants, he was able to determine the minimal amount of preoperative root growth essential to assure the future viability of the transplant in the host site. His criteria have been accepted by all researchers interested in this field. Apfel also developed and described a sound surgical approach. His work was received with enthusiasm and encouraged many other research workers to institute similar studies.

Miller[3-7] has reported on many autogenous transplants in which results were achieved similar to those of Apfel. Hale[8] published a comprehensive review of autogenous transplants and described an alternative surgical technic. Reports of autogenous transplants have also been published by Collings,[9,10] Siegel,[11] McMahon,[12] Noble,[13] and Feinman and Kallis.[14] Favorable and unfavorable sequelae to transplants have been reported by Clark and co-workers.[15] Fleming[16-19] published highly significant observations in a closely related field of heterotopic heterotransplantation.

Fong,[20] in clinical studies, analyzed successes and failures, and arrived at conclusions similar to those of Apfel, although he employed a different surgical technic. The transplant, instead of being deeply buried, was placed in an occlusal

Presented before the Section on Pedodontics, ninety-sixth annual session, American Dental Association, San Francisco, October 17, 1955.

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relation relatively the same as that which it had occupied prior to surgical intervention; that is, just under the crest of the ridge. Early in 1951, he envisaged the ultimate possibility of a tooth bank, and in 1953 a paper was published elaborating on this possibility.

The purpose of transplantation that is obvious to the patient is the maintenance of the integrity of the masticatory mechanism. Less obvious, but of high value to the dentist, are the preventive phases of the operation. The loss of a first molar, if there is no surgical or mechanical replacement, may result in tipping, drifting, or elongation of teeth, lateral stresses with occlusal interferences, bruxism, aggravation of periodontal lesions and neuromuscular and temporomandibular joint disturbances. Pulpal injury is frequently a concomitant, and pain, localized in pulpal or periodontal regions, is observed often. Pain of obscure nature affecting jaws, face, musculature or temporomandibular articulation, especially in older patients or as a late sequela, may be connected with many of these phenomena.

TRANSPLANTATION VERSUS SUBSTITUTION

Before a decision is made to transplant a tooth, a critical study should be made of the advantages and disadvantages of this procedure as against other forms of treatment, notably fixed bridge construction.

The advantages offered by a well designed and constructed fixed bridge are: (1) the construction and engineering principles are balanced with the physical properties of the metals used; (2) a biomechanical restoration is well adapted to the abutment teeth and articulates satisfactorily with the opposing teeth; also, the anatomic form is in harmony with other teeth; (3) functional balance is achieved.

The disadvantages of a fixed bridge may include (1) the frequent necessity for the sacrifice of tooth tissue in a noncarious tooth; (2) the estimated chance of failure—5 to 10 per cent—because of secondary decay or marginal leakage which jeopardizes the integrity of the abutment tooth; (3) accidental pulpal exposure; (4) excessive or traumatic occlusal stresses, and (5) the subsequent lowered resistance of abutment teeth if systemic disease occurs.

The advantages of a successful transplant are: (1) the substitution is a sound, healthy, vital and esthetically satisfactory tooth; (2) there is no need for mechanical retention or for sacrifice of healthy tooth tissue; (3) a good periodontal attachment is assured and there is no problem of gingival irritation or pocket formation due to substitution; (4) normal hygienic status is maintained, and (5) biological and functional balance is restored.

The disadvantages are: (1) the procedure is not applicable in all instances, and (2) there is a 5 to 10 per cent chance of failure. These failures may be due to the unsuitable stage of development of the transplant, traumatic injury, or to unknown factors.

CLINICAL STATUS OF TRANSPLANTATION

The autogenous transplantation of the lower third molar into the first molar region is successful if the patients are selected judiciously and if sound operating procedures are utilized.

The pulpal response to stimuli in transplanted teeth varies widely. A positive response to electrical or thermal stimulus may be elicited within a few months after transplantation or may be delayed for as long as two years.

It is a common clinical observation that the pulp chamber and root canals become considerably reduced through the deposition of radiopaque tooth substance along the walls. From the biologi-

cal and functional standpoint, it may well be that the usefulness and permanence of the transplant are not substantially jeopardized by these pulpal changes. If such a postulate is correct, the existence or the extent of sensory response of the pulp of the transplant may not measure the success of the operation.

A clinically successful transplantation may or may not demonstrate, roentgenographically, the ultimate attainment of normal root length. Since the root primarily serves to anchor the tooth firmly in the socket, shortened or stunted roots may still serve this useful function, without clinical implications, provided the other stress factors are within normal range.

The transplantation to sites other than that of the lower first molar has been experimentally explored in the human mouth.

The relocation of developing upper third molars to the sockets of upper first molars has been successful. The hazards of antral involvement can be reduced by a skillful operating technic, and other problems may be controlled by the operator. However, a major difficulty encountered is that of adequately restoring the mesiodistal width of the first molar space in the arch by means of the insertion of a smaller tooth. It is necessary to select the instances for this transplantation extremely carefully. Subsequent operative procedures to increase mesiodistal dimension may be contemplated in appropriate instances. The optimal limits of growth of the transplant prior to transfer are similar to those needed for lower third molar transplantation. A degree of root growth less than one quarter or more than three quarters of maximal development would militate against successful results.

REPORT OF CASE

The following case report illustrates the successful transplantation of a third molar (Fig. 1, 2).

The patient, a 16 year old white

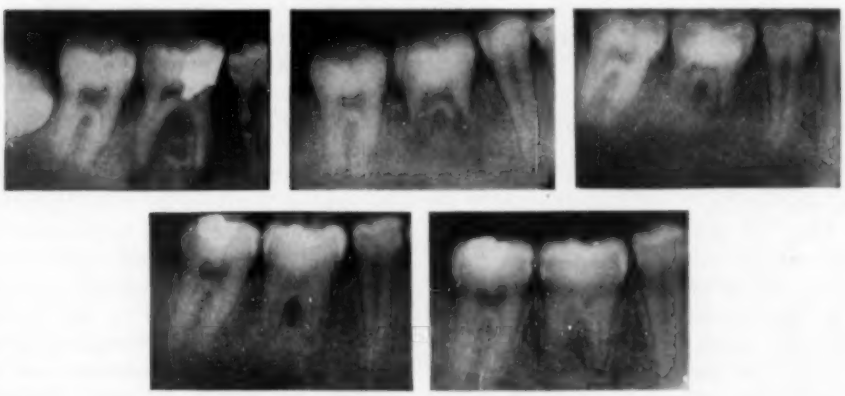

Fig. 1 • Above left: Preoperative view of badly abscessed lower first molar. Area of damage extends into bifurcation. Above center: Eight months after surgery. Bony socket has been well-filled with new bone. Lamina dura can be seen on mesial aspect of mesial root. Tooth seems to have reached full occlusal height. Root apex wide open. Above right: Fourteen months after surgery. Tooth has attained full occlusal height and roots continue to lengthen. Pulp shown is reduced in size; root apex still open. Below left: Thirty months after surgery. Lamina dura is visible and well defined. Roots have lengthened apically. Bony status is satisfactory; some bony condensation periapically. Below right: Four years after surgery. There is well defined and intact lamina dura. Apexes of roots seem to be closed

Fig. 2 • Five years after surgery. Lower right first molar is shown in good alignment buccolingually. Opposite first molar, also a transplant, is in excellent condition with normal color and sound gingival attachment

housewife, had an extensive chronic abscess of the lower right first molar which extended into the bifurcation region. Since the patient's health was satisfactory, it was decided to remove the first molar and transplant a developing third molar from the same side.

The postoperative course was as follows:

At eight months, the bony socket was well established, the soft tissue attachment was good and no periodontal lesion was present.

After 14 months, the clinical status was excellent. The tooth was firm and there was roentgenographic evidence of vertical growth of roots. The pulp chamber was smaller.

After 30 months, the clinical status was normal. Further lengthening of the root could be seen roentgenographically. The bony status was satisfactory; there was some condensation periapically.

After four years, the clinical status was normal. The response to electric stimulus, ice chips, ether and heat was in harmony with the responses of the adjoining second molar and the opposing first molar.

Subsequently, to repair a carious lesion, a distoocclusal restoration was placed in this tooth. The preparation was carried out without anesthesia, and the pulpal response to operative procedures was normal.

Roentgenograms showed the bony status to be excellent, with intact lamina dura. The pulp chamber and canals were noticeably reduced in size.

After five years, the tooth was in good alignment buccolingually, and was in good cuspal relation to the upper molar. The tissue attachment was excellent and there was no evidence of a periodontal lesion. The patient also had an autogenous transplantation of the third molar on the left side which was in excellent condition with satisfactory pulpal response.

HISTOLOGIC STUDIES OF TRANSPLANTATION

Studies were undertaken of the transplantation of third molars into the sockets of first molars in rhesus monkeys. Obviously, optimal results in clinical work, the solution of many problems encountered thus far, and the potential extension of the process beyond the narrow limits currently recognized, demand that thorough histologic and other studies be made. Where failure to reestablish viable relations with the host has occurred and the tooth has had to be sacrificed, the microscopic study of it or of contiguous tissue is of value but is inadequate for definitive observation of the biologic phenomena involved in transplantation. It is desirable, therefore, to perform the transplantation in a suitable experimental animal, using methods strictly comparable to those employed in the human mouth, to make clinical roentgenographic and photographic examinations and, at autopsy, to secure sufficient material from the jaws to permit controlled histologic examination of all pertinent tissues in their natural relations.

The rhesus monkey was selected because of its anatomic and functional similarity to the human being.

Three animals have been operated on

to date in this series, permitting the study of four operations, terminated at four days, four weeks, four months and two years, respectively. Animals were selected on essentially the same basis as that used in human transplantation, except that the sacrificed teeth had not been diseased as is usually the case in human experiments. The animals were healthy and on a standard adequate diet. The development of the third molar had slightly passed the point of bifurcation formation in the four day, four week and four month experiments. In the two year experiment, the root development had already well exceeded the point of bifurcation formation.

The technic of transplantation in the monkey paralleled that performed in the human, with the exception that since, in the monkey, the molars become progressively larger from first to third, it was necessary to remove both the first molar and the second premolar in order to provide mesial and distal width for the third molar. As a result, close adaptation of the teeth at the contact area was not feasible.

The loosened third molar was transferred directly from its crypt into the prepared and enlarged space. The follicle usually was removed over the crown portion, its cervical attachment being undisturbed. The transplant was placed in its new site slightly below the crest of the bony ridge and in a relationship comparable to that which the tooth had occupied prior to transplantation. The soft tissue was sutured over the region and no other fixation was employed. Roentgenograms were taken of the jaw periodically during the course of the experiment.

FINDINGS

Four days postoperatively, the third molar was in the enlarged bony socket (Fig. 3, above left, A), its root ends were contacting bone at certain points (Fig. 3, above left, B) and lying free at other points (Fig. 3, above left, C). The tip of the developing root was slightly everted from the force of insertion. In one instance the tip was turned inward (Fig. 3, above right, B), in another outward. The Hertwig's sheath was discernible, although it had deviated somewhat in position. The organizing clot filled the interradicular space, and there was vigorous production of the new fibroblasts and new capillaries characteristic of granulation tissue (Fig. 3, above left, D). This active granulation tissue contacted the wide pulpal openings and enveloped the lower portion of the outer or interproximal (interdental) root aspects.

The bony response was noteworthy. Peripheral trabeculae of the original bone were included in the boundaries of the organizing area, some of them apparently thinned in the enlargement of the space (Fig. 3, above left, A). One area of socket bone was in immediate contact with the side of the inserted third molar root, the intervening soft tissue having undergone necrosis (Fig. 3, above right, A). Slender trabeculae of new bone were forming in the organizing area: vigorous osteoblasts indicated a high degree of formative activity (Fig. 3, above left, E). Blood vessels, too mature to be products of new formation and obviously carried over with the transplant, could be seen along the external aspects of the trifurcation of the roots and at the wide outer openings of the pulp canals. Laterally and cervically, the circumdental region showed no organization as yet.

The pulpal tissue was free from evidence of mass necrosis or autolysis. Histologic evidence of change was least in proximity to the wide apical openings and most noticeable at regions most distal to the source of potential diffusion of nutriment (Fig. 3, above left, F).

In the regions contiguous to the tissue of the host site, the odontoblasts were still identifiable along the lower borders of the developing root ends (Fig. 3, above right, C) and in the vicinity of Hertwig's sheath. The pulp in this region

retained the characteristic appearance of young pulp—semigelatinous, lightly fibrillar, with large healthy looking stellate and fusiform cells, their nuclei large and viable in appearance (Fig. 3, above right, D).

In regions remote from the vascular tissue of the host, histologic changes were apparent. Passing upward, in the microscopic examination, from the wide apexes toward the crown of the transplanted tooth, the odontoblasts in some regions had disappeared whereas in others they were still identifiable through their positions and arrangement, but were distorted in form and pyknotic (Fig. 3, below, B).

The pulpal tissue in the upper pulp chamber and horns was stained much more lightly than elsewhere. Considerable edema was present; the nuclei of pulp cells were few in number and pyknotic. The presence of fine, wavy fibrillae extending in bundles through the edematous, lightly-stained zones where there were few pulp cell nuclei was noteworthy (Fig. 3, above left, G).

Many of the blood vessels, whose cir-

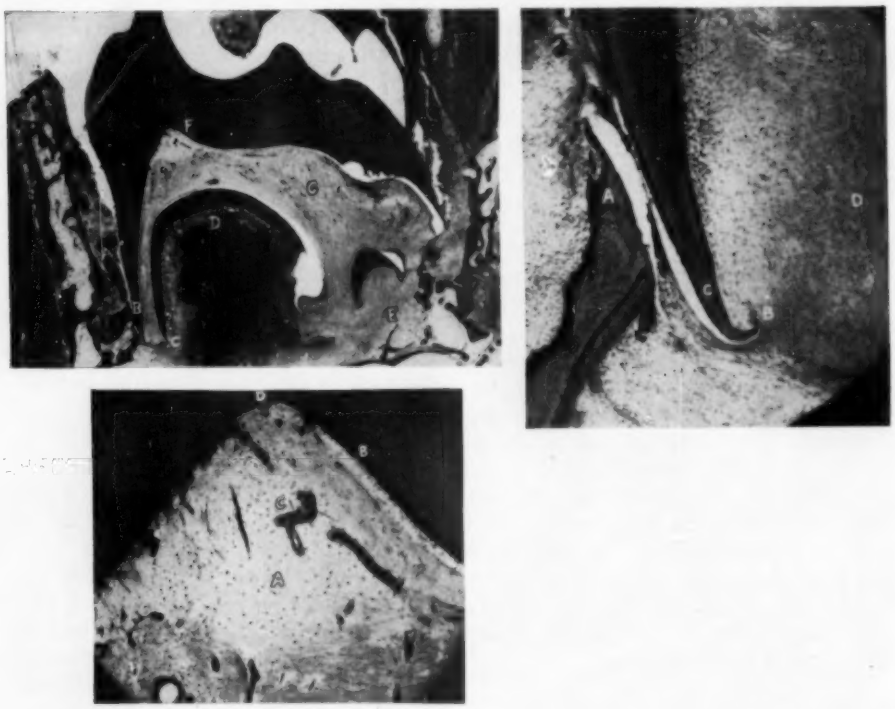

Fig. 3 • Transplant, four days postoperatively. Above left: A, enlarged bony socket. B, root end contacting bone of socket. C, root tip lying free from contact with bone of socket. D, vigorously organizing clot. E, slender trabecula of new bone. F, region most remote from tissue of new site with most noticeable pulpal change. G, pulpal zone of fine, wavy fibrillae. Above right: A, contact of root tip with alveolar bone; necrosis of intervening tissue. B, inward version of developing root tip due to slight trauma of transplantation. C, odontoblasts along lower border of developing root tip. D, normal young pulp. Below: Higher magnification of horn of pulp seen above left. F, A, conical area of partial breakdown of pulp tissue. B, odontoblasts, modified in form and pyknotic. C, original blood vessels of transplant, engorged. D, zones of intrapulpal hemorrhage

culation had been cut off at the moment of removal of the third molar from its bed, could be seen engorged with cells whose outlines were still discernible (Fig. 3, below, C). In the roof of the pulp chamber, areas of hemorrhage into the tissues were seen (Fig. 3, below, D).

Four weeks postoperatively the tooth, although not yet in occlusal contact, was generally substantially advanced in normal integration. Within a deep crypt of new bone, the developing periodontal membrane was preparing for functional status (Fig. 4, above, A). Vigorous collagenous fibrous tissue was seen, oriented in a manner comparable to the normally developing tooth; that is, the tooth-to-bone fiber bundle grouping was yet to be accomplished, awaiting the initiation of function (Fig. 4, above, A).

The newly formed bone stood out prominently against the old with its more exuberant and delicate young trabeculae as yet free of the evidences of cyclic building and resorption (Fig. 4, above, B), and not yet oriented toward the pattern subsequently required by the suspensory apparatus for support and resistance. Both interradicular and periradicular bone demonstrated a high degree of normality (Fig. 4, above, B and C).

Crevicular and gingival regions had been established to a considerable degree (Fig. 4, above, D). The pulp and dentin at this stage seemed relatively healthy and functional, which suggested a capacity for sustained viability. Certain significant characteristics, however, were noted at the apical portion of the root. Here, at the point of the latest preoperative activity of Hertwig's sheath, there had been a cessation of normal increment of dentin presided over by normal odontoblasts and characterized by normal tubule formation. The trauma of transplantation had been followed by the irregular deposition of osteodentin (callus). The contours of this osteodentin showed varying patterns at different levels in the sections, and there were many irregular cell spaces and cellular inclusions (Fig. 4, below left, A). The original delicate tip of the growing dentin was grossly obscured by these deposits (Fig. 4, below left, B). On the surface of this distorted region, that is, in the zone of the most recent activity, cells, strongly resembling odontoblasts, and occasional narrow zones of tubular dentin attested to the possibility of ultimate resumption of normal processes (Fig. 4, below right, A).

In the other parts of the specimen, the dentin lining the pulp chamber and the root canals showed an over-all thin layer of osteodentin after the noxious and perhaps temporary effect of the transplantation on the odontoblasts (Fig. 4, above, E).

The pulp showed differing characteristics in different sections; in the apical and lower canal regions it was comparable to the pulp of any growing tooth in cellular and intercellular character. Numerous blood vessels of small and medium caliber could be seen. There was clear evidence of canalization of the original ruptured vessels. At the pulpal margins, Korff fibers were seen entering the dentin matrix in typical corkscrew formation. In the more remote pulpal regions, that is, the pulp chamber and upper canals, there was much coarse fibrous tissue, particularly prominent in the Mallory-stained sections (Fig. 4, above, F). The regions of odontoblast recovery (or regeneration) and the slight evidence of resumed tubule formation (Fig. 4, above, G) were significant.

Animal experiments carried out over longer periods, that is, four months and two years, were complicated by exposure of the transplant to heavy stresses incidental to the specific conditions of the experiment. As indicated earlier, the large size of the tooth necessitated removal of both the first molar and second premolar and precluded close apposition of the transplant to the neighboring teeth. Contact support, therefore, because of the excessive space, could not be secured.

Fig. 4 • Transplant, four weeks postoperatively. Above: A, developing periodontal membrane of transplant. B, crypt of new bone, interradicular. C, crypt of new bone, periradicular. D, gingival and crevicular areas. E, narrow layer of osteodentin. F, coarse fibrous pulpal tissue. G, region of resumed tubule formations. Below left: A, irregular osteodentin formation at tip of developing root of transplant with irregular spaces and cellular inclusions. B, original tip of developing root at time of transplantation obscured by osteodentin deposits and some repaired resorption. Below right: A, odontoblasts, recovered or regenerated, resuming tubular dentin formation after period of osteodentin deposition. B, active Hertwig's sheath

Further, external fixation of the transplant or other protective measures were not taken. The diet, adequate nutritionally, was, in part, hard and capable of inducing substantial pressures on the transplant prior to its full orientation to load bearing.

Microscopic studies indicated tendencies toward cessation of growth in the tubular dentin of the root and toward the lining of pulp chamber and canal walls with osteodentin. Compensatory mechanisms, serving to offset the biologic handicap of inadequate dentin root length and to provide firmer attachment included periapical and parietal hypercementosis. A further and unexpectedly encountered mechanism was that in which there was ingrowth from the periapical bone deeply into a pulp canal of a spike of dense bone. The invaded pulp tissue of the canal showed transformation into a fibrous structure similar to that of the periodontal membrane with evidence of fiber bundles linking the bone with the pulp canal walls.

Osteodentin formation appears to be a major phenomenon in transplantation, tending to line thickly or even to obliterate the pulp chamber and canals. This is encountered not only in autogenous transplants, but has been reported by Fleming[16-19] in intraocular transplantation of tooth germs.

Of significance, however, is the observation made in the four month transplant, that, after substantial deposition of osteodentin, regional regeneration or recovery of osteoblasts has permitted resumption of tubular dentin formation along pulp chamber and root canal walls.

DISCUSSION

The histologic findings in the four day and four week specimens indicate, on the whole, highly favorable reactions to the trauma of operation and the demands of the transplant in its new environment. Noteworthy at four days are, for example, the exuberant organization of the clot, the appearance of new trabeculae of bone and the maintenance, within the pulp chamber and canals, of sufficient diffusion of nutrients to obviate mass necrosis of pulp during the adjustment period; and, at four weeks, the regeneration or recovery of odontoblasts permitting resumption of tubular dentin formation, the reestablishment of circulation, and the vigorous growth of healthy new bone, periodontal membrane and gingiva. The observer might cautiously postulate that had these experiments been carried out for a longer period of time, the transplant might possibly have demonstrated a substantial degree of morphologic, positional and histologic normality.

Less favorable conditions were noted in the experiments carried on for four months and two years. It would seem reasonable to suggest that conditions of operation and of postoperative maintenance may be chiefly responsible for the deviations from the desired structure and alignment that were noted. Knowledge of the structure and function of Hertwig's sheath and the sequence and direction of root dentin elongation indicates that vulnerability to injury on the part of this sheath may, at least in part, explain the observed cessation of apical dentin formation. Exposure of the tooth to masticatory or other pressures under environmental conditions differing from that of normal growth and eruption into function may add further insult to the trauma of surgical transplantation and may preclude the normal stimulation of dentin formation, resulting in substitution by, or overgrowth of, osteodentin.

Further animal experimentation may permit histologic analysis of conditions strictly comparable to the optimal human clinical results thus far obtained. Such modifications should permit, to a higher degree, the utilization of the advantages of microscopic study as well as the accelerated age cycle of the experimental animal.

CONCLUSIONS

Transplantation of the third molar, currently established as a feasible and defensible operation, within strictly defined limits, may be undertaken by the dental surgeon on a basis of expectation of success and of difficulty as follows:

Optimal Results • Root development, roentgenographically observed, to a degree approximating the root length normal to the tooth, may be attained. Root formation may be resumed after the shock of transplantation, possibly marked by slight localized irregularity of dentin formation and contour.

Normal and healthy crypt bone, periodontal membrane and gingival tissue may develop, as indicated by clinical and roentgenographic observations.

Normal functional alignment and capacity, firmness in the socket and response to stimuli may be achieved.

Suboptimal Results • The suboptimal results may be cessation of dentin growth at the root tip, probably related to trauma incurred during the operation or during early stages of development of the transplant. The vulnerability of Hertwig's sheath may possibly be the dominant factor.

There may be compensatory overgrowth of cementum which would serve to increase the attachment surface of a tooth otherwise deficient in this respect.

Intracanalicular ingrowth of periapical bone in the form of a bony "spike," possibly a compensatory mechanism, might occur, with transformation of pulpal tissue between spike and canal wall into a modified fibrous attachment tissue.

Osteodentin may form along pulp chambers and canal walls to an extent varying from a narrow lining to virtual closure of the pulpal space.

Ultimate regeneration or recovery of odontoblasts may be achieved with reestablishment, at least regionally, of tubule formation as possible sequelae to postoperative injury to, or elimination of, odontoblasts, with associated osteodentin formation.

There may be delayed or diminished pulpal response to stimuli.

Unfavorable Results • The unfavorable results may be infection, followed by tissue breakdown and elimination of the transplant, and possible tooth resorption, with or without subsequent ankylosis.

The Dental Profession • The dental profession has established and prolonged the reign of beauty; it has added to the charms of social intercourse, and lent perfection to the accents of eloquence; it has taken from old age its most unwelcome feature, and lengthened enjoyable human life far beyond the limit of years when the toothless and purblind patriarch might exclaim: "I have no pleasure in them." *Oliver Wendell Holmes, speech, The Claims of Dentistry.*

Efficient office routines

Clyde L. Stroup, D.D.S., Fairfield, Ill.

The last 20 years have spotlighted the necessity for more efficient organization of practice by dentists. Dentists in military services were exposed to planned routines in the treatment of servicemen. Dentists remaining in civil practice were pressed to meet the increased demand for dental service. Since World War II an increased population, more health conscious and with larger incomes, has continued to make greater demands on dentists. In view of the fact that the ratio of dentists to population has changed, the dentist himself has experienced a necessary increase in his capital investment and his fixed operating expense. With it all, he has also an increased tax burden.

There was a time when a dental education was comparatively inexpensive. Fixed operating costs were low, and a dentist could comfortably provide service for his patients and profit to himself in a one-chair office without any assistance. There appeared to be no particular reason for him to give much thought to improving his efficiency. As costs of education, equipment, supplies and fixed overhead have increased and the tax load has decreased his net profit, the dentist has had to face certain adjustments.

Two phases of practice were open to review—fees charged for services could be increased, or better utilization of the dentist's time and facilities could be explored. Both of these aspects have received considerable attention in most offices. More efficient procedures, such as improved cutting methods, new impression technics and water coolants, have received the major portion of the professional study. Controlled casting technics and many other new devices allow more dentistry of better quality for more people. This has made it possible for dentists to keep their fee increase lower in proportion than the price increases in other commodities and services.

Improved technics are of little use unless they increase the comfort of the patient, advance the quality of service, or decrease the mental and physical strain of the dentist. Utilization of the modern technics in dentistry requires the careful development of specific routines and desirable habit patterns by the dentist and his associated personnel. A dentist must examine his practice aims in a detached or objective manner and decide what he is trying to accomplish.

As a general practitioner, he is a multispecialist. His armamentarium must include all the instruments as well as the technics of all the specialized services combined in a harmonious pattern that avoids conflict in methods or duplication of materials. If a dentist were to specialize in roentgenograms, his office arrangement would be considerably different than if he were to specialize in pedodontics. A periodontist's arrangement

Presented before the Section on Practice Administration, ninety-seventh annual session, American Dental Association, Atlantic City, N. J., October 1, 1956.

would not lend itself to an efficient practice of prosthodontics. The laboratory requirements of operative reconstruction would be useless to an oral surgeon. Yet all these facilities must be combined and harmoniously adapted to serve the needs of a general practitioner without unduly increasing his capital investment or cluttering his operating suite.

PLANNING AND ORIENTATION

Planning and orientation of each step is required in the performance of any treatment. Thus an operating room can be made to serve the needs of pedodontics, periodontics, surgery, operative dentistry, prosthodontics and roentgenography. A laboratory can be designed to accommodate prosthetic and reconstruction procedures. Instruments can be made to serve dual purposes and be placed so they are convenient for multiple uses if thought is given to what they will be needed for. All of this planning and placement must be done in the absence of patients, and is related only to the requirements of the dentist himself and the demands made by certain operating technics.

Dentists have labored long in learning the step-by-step requirements of treatment technics, and it is comparatively simple for them to take a comprehensive view of these requirements. They know, for instance, that a complete denture requires an impression of the mouth, and that they will use certain specific materials and instruments in obtaining an impression. They also know that a bite registration will be made and again will require particular appliances and methods. They are familiar with the between-appointment arrangements that must be made so that a trial setup may be approved. They will have determined the interval necessary for processing so that the dentures may be delivered to the patient. This is a step-by-step procedure for one specific treatment. This same step-by-step sequence is a requirement of all dental operations.

Most dentists could easily outline a program in writing for each of their specific technics with the materials, instruments and equipment necessary, treatment time and appointment intervals, whether it were for dentures, roentgenograms, or an extraction. These steps and material requirements are dependent on the treatment to be accomplished, and are not determined by the personalities or frailties of patients. It is only after the technic has been outlined that the patient is considered at all and then only to the limit that the technic will allow. No patient likes temporary fillings, but they are necessary to the technic of construction of gold inlays, so the patient is adapted to the technic. Where tolerable inconvenience is necessary, it is accepted. Where intolerable situations prevail, a different technic is developed.

HANDLING OF PATIENT

It is desirable to outline a step-by-step method for the handling of patients. An excellent procedure is to determine what questions will be asked and to write out the answers. The dentist or one of his staff should explain to the patient the reasons for the examination, the necessity of the treatment, and the accounting procedures. A careful examination of all the details incidental to this explanation will help decide which of them may be changed or modified for the sake of convenience. It will also show if the procedure is direct or if there are unnecessary motions. An over-all pattern to be used for the basic types of patients, that is, children, prosthetic, operative or surgical, is thus developed. Specific routines based on such an analysis can then be designed to accommodate an even flow of the various types without friction among them or between the patient and the dentist or associated personnel.

Inefficiency in most dental practices is

due not so much to the dentist's failure to utilize his technical training; rather, it is in the improper and unplanned routing of patients so that his technical skills are not used effectively. After technics have been developed and instruments and equipment have been properly and efficiently placed, comes the chore of scheduling patients in such a manner that the tools and technics can be employed advantageously.

Many items will have to be considered separately in designing this flow; type and placement of equipment, types of services to be performed, number of patients to be handled, and number of auxiliary persons required. Dentists should now add to the step-by-step sequence of dental treatments, a planned program which takes into account the personalities and capabilities of both patient and dentist.

Certain information concerning every patient is necessary, and this information is best obtained at the initial visit before any treatment has been started. It consists of identification information, and a recording of the reason for the patient's visit to the office. It is fortunate that the initial step in a program for complete dental care can be used to advantage in adapting patients to receive complete care. This step is the examination, which includes a thorough clinical examination of the mouth, a complete set of roentgenograms, impressions for study casts, and a comprehensive medical history. The clinical examination should concern itself not only with recognizable dental defects, but should also include the dental history and experiences of the patient, including previous dental treatment. Only by recording all prior dental work and the obvious dental defects are practitioners able to make a diagnosis and treatment plan to maintain good dental health for the patient.

The modern dental patient expects and appreciates complete mouth roentgenograms and study casts of his mouth as a part of dental examination. Modern dentists agree that a diagnosis or a prescription made without these aids is folly. Therefore these procedures are essential to the preparation of an optimum treatment plan which will be in accord with the intellectual, sociological and economic classification of the patient. When the treatment recommendations have been accepted, the problem of scheduling the patients for the completion of the treatment is a matter of appointment control.

APPOINTMENT BOOK

The appointment book, properly controlled, becomes a control board for the office similar to a board used by a dispatcher for a railroad. It allows the dentist to have an even flow of patients who can be handled efficiently with a minimum of effort. When treatment has been planned in advance, it is a simple matter to determine the necessary time to reserve for any specific operation. No time is wasted and no time is overcrowded.

Without sufficient planning and the development of organized routines, the appointment book becomes a mere date book. It has no relation to the operating procedures that have been established in the office. Patients arrive, their immediate needs are determined and minor treatment instituted. Treatment that cannot be done is left for another appointment. A future date is made with the patient, and the same thing happens over and over.

This kind of a program overcrowds many hours and leaves much time wasted that could be used effectively in giving modern dental services. The most serious consequence is that the patient never achieves optimum dental health and comfort. He receives only those emergency services which can be accomplished quickly. No effort is made to diagnose the patient's over-all dental condition. No measures are taken to intercept and correct a hazardous condition. Much

treatment is never undertaken, and too much of that which is instituted does not contribute to the patient's total health.

The appointment book or control sheet in a modern office is controlled primarily by the demands of the office, not by the demands of patients. It is adaptable within reason to accommodate almost any person within the realm of the working day. Just as the dentist decides in the beginning what hours his office will be in operation, he must decide also how the individual hours in that time will be utilized. First consideration must be given to his own personal demands and the demands of certain technical procedures. Second consideration can then be given to the patient's convenience. Seldom should it be necessary to accommodate the patient above the demands of the office and the dentist. With proper control of the appointment book, the dentist will find that not only is time utilized more efficiently, allowing him to give more and better services, but also the patient's time is conserved in that unnecessary trips to the office and unwarranted delays in the office are avoided.

Since the time required for dental treatment is not always predictable, and even the outlined procedures sometimes require extra attention, provision should be made for contingencies in the appointment book. This is accomplished best by allowing at least one full hour each day to care for unpredictable events. This hour may be divided into a half hour in the morning and a half hour in the afternoon, or one full hour any time during the day, or any arrangement that will suit the dentist's convenience. No treatment should be scheduled into this hour except on the day of the appointment. If this hour is kept open, the dentist will be allowed more freedom of movement. He may overlap on some of the procedures that have required more time. He may use it to care for an emergency, or he may even use it as a period of relaxation which is never unprofitable so far as the health of the dentist is concerned.

OFFICE PROCEDURE MANUAL

When the step-by-step disciplines of treatment have been combined with the orderly scheduling of patients, the dentist has a controlled practice procedure. When this program has been written out, there is created an office procedure manual. Every dentist has an office procedure manual whether he has conscientiously prepared one or not. It makes no difference whether it was arrived at by accident, by circumstance, or by design. It has been committed to memory and delegated to habit, and it influences his total efficiency.

Any dentist who will make the effort to write down his routines as he now uses them will recognize major inefficiencies in his practice habits. Some details will be found to be in open conflict with his professional philosophy. Others will antagonize patients and have a noticeable effect on his personal and professional relations. He may be allowing some procedures to make unnecessary demands on his physical and emotional resources. Recognition of these inadequacies will automatically correct many of them. When the dentist comes face to face with incidents in his practice which are not in harmony with his professional ambitions, he will take measures to correct them. This can come about only by making a comprehensive study of all the facets of his practice and recording his observations in an office procedure manual.

The office procedure manual has many desirable functions. It is a curb on gadget enthusiasm. It requires thoughtful, methodical integration of new procedures into a dental practice. Outmoded habits are made visible for examination and evaluation. This manual becomes a textbook to facilitate the training of assistants to the dentist's individual philosophy. The

greatest asset of such a journal is the dental health reward to the patient. By recording in advance professional aims in the patient's behalf, the dentist in effect gives himself a reputation to live up to. The patient will routinely receive the full benefit of the dentist's skills.

Shakespeare has said that all the world is a stage and people but actors in it. No actor would give a commendable performance without an adequate script. The office procedure manual is the script for dental practice. It will assist in preparing complementary backdrops on the office stage. As the director of the production, the dentist can train auxiliary personnel who are the supporting actors. He can cue them in the parts they are to play. He can control his own professional development. He can intelligently adopt newly developed procedures and discard outmoded technics. His written manual will help him evaluate the efficiency of his present methods. It becomes a reference work for all the things which must be remembered in dental practice.

This office procedure manual must be prepared by the dentist. It has to fit his practice and his philosophy. It cannot be adapted from someone else. It must be prepared in the same way as he designed the physical layout of his office, by projective imagination. He must visualize the situation he wishes to record and then write down every step concerned with the event. A good office procedure manual will never be completed, but will be revised constantly. This automatically insures adherence to one of the major tenets of the profession—the dentist will remain constantly a student and keep informed of modern developments.

SUMMARY

Efficient office procedures are determined by conscientious self-analysis of the dentist's capabilities, his aims, ambitions and degree of skill. Recording of data from his professional training, from his experience and from projective imagination makes an office procedure manual. This individual diary of his practice serves many functions:

1. It provides an even flow of patients.
2. It helps insure that patients will receive the benefits of modern dental procedures rendered efficiently and effectively.
3. It is an invaluable aid in training auxiliary personnel.
4. It acts as a job analysis for auxiliary personnel and defines their duties.
5. It will serve as a memory for a host of unrelated details which require periodic or occasional reference.
6. It serves to focus attention on undesirable elements in the practice and becomes a starting point for their correction.
7. It will relieve tension in the dentist himself and in his assistants when each of them knows specifically what is expected.
8. The increased operating efficiency brought about by preparing such a manual will be reflected in the time, temper and income of the dentist.

101 East Center Street

Factual Writing • I have been very careful to write nothing but what was the product of faithful observation, and neither suffered myself to be deceived by idle speculation, nor deceived others by obtruding anything upon them but downright matter of fact. *Thomas Sydenham, English physician, 1624-1689.*

Our basic responsibilities

William R. Alstadt, D.D.S., Little Rock, Ark.

During the past year, as president-elect of the American Dental Association, I have appeared before 34 dental groups in 16 states, the District of Columbia, Mexico, Japan and the Philippines. In addition, I have appeared before one medical group, three rural health conferences and one public health conference. I have made numerous radio and television appearances, given civic talks, have served on governmental agencies, and have had articles regarding dentistry in two national farm magazines.

The correspondence during the year has required the services of one full-time secretary. I mention these facts only to indicate how much our profession has grown, and how much of a responsibility and opportunity dentistry has as a major health profession.

The profession has made rapid strides during the 98 years that we have had a dental organization. In the past few years there has been rapid progress in public relations and in scientific achievements. These have been made possible through the united efforts of the members of the dental profession. This is no accident, but is the result of the profession working together for the welfare of humanity.

Our basic responsibilities demand that we understand first we are American citizens; second, we are dentists; and third, we may be specialists, research workers, school instructors, dental administrators, or we may work in other fields.

Once in a great while in my travels over the United States during the past six years, I have met some officer of a local dental society or a state dental association who complains that "they" forced the job on him. I have no sympathy with that individual, but I do have sympathy for the organization which he represents, if the situation is actually true.

Any officer who does not have the time, the patience, the inclination or the desire to serve the public and the dental profession in various capacities should not serve as an officer in these organizations. Serving as an officer in a dental organization is accompanied by honor, by prestige, and also by many hours of hard work and by responsibilities. I can truthfully say that the vast majority of the men who have served and who are now serving accept these honors and these responsibilities in a very commendable manner. That is why our profession is making such rapid progress, and all of us can be proud of this progress.

I think that it is time that the membership is made more aware of the fact that although we must have presidents, presidents-elect, vice-presidents, secretaries, and other officers, actually the 13 trustees are the ones who administer the policies established by the House of Delegates. Your trustees individually and as a group

Presented before the State Society Officers Conference, ninety-eighth annual session, American Dental Association, Miami, Fla., November 3, 1957.

are far more powerful than the president, president-elect or other officials. The trustees are the ones who nominate persons for council positions, who supervise budgetary items, council and other Association activities; in fact, actually operate the Association according to the directions of the House of Delegates.

Having served on this Board, I can assure you that you have 13 individualistic persons doing their best to represent their trustee districts and the American Dental Association, and even though mistakes have been made, I believe that you will agree that the good that is accomplished far outweighs any honest mistakes that have been made. Having participated in many battles on this Board, having won some and having lost some, I can assure you that it is a very democratic and dedicated group.

I do not wish to force my opinion on anyone; however, I honestly believe that a state dental association that changes its secretary too often makes a mistake. I do not believe that any officer is indispensable, or that he should serve forever in a particular category, but, regardless of the compensation that he may receive, or regardless of political considerations, the secretary is the one man that knows who will function in various committee assignments; he knows who attends the various meetings; he knows who is generous with his time and money in supporting the objectives of the association; he knows whether an individual is willing or reluctant to cooperate; and in many instances, he is the hub of the dental organization.

Many of the same remarks can apply to the changing of dental editors too often. Although some of us get a little exasperated with an editor if he leaves out something that we did or if he misspells our name, we must realize that it actually takes a person of unusual ability to make a good editor. The state dental journal is the spokesman for the state dental organization, not only within the boundaries of each individual state but all over the United States, and in many instances, all over the world. The type of dentistry that is practiced and the type of membership that the organization has is reflected by the dental journal.

From a public relations standpoint, each state should have a good dental journal, use a good stock of paper, select the editor carefully, and not replace him too often, because it takes time for a person to become trained in this position and to operate efficiently and in the manner in which the state desires to be represented.

It is a pleasure to note that many of our states now have lay secretaries, called either executive or assistant secretaries. Regardless of terminology, they contribute much to the efficiency of our dental organizations. It is interesting to note that they become exceedingly absorbed in their job and that most of them give excellent service.

Although it is wonderful to have a good state secretary and executive secretary, these officers must be sure that the members have an opportunity to be active in the operation of association affairs. Along this same line of thought, I frankly favor the increase from five to seven in the membership of the American Dental Association councils because the Association has more members than ever before and an increase will mean better coverage and better representation.

State and national officers have a greater responsibility today in the selection of committee personnel than ever before. Changing times have made us realize that we must have personnel adapted to and interested in dealing with federal, state, and local governmental agencies, big business, labor organizations, insurance corporations, and Blue Cross-Blue Shield organizations. In this connection, I sincerely hope all states will complete new fee surveys in the very near future—it is very necessary to do that.

State officers must be responsible for

good scientific programs, and also must be on guard against "scare" campaigns, "high pressure" clinicians, "sensational" methods, and similar technics that lower the standards and prestige of the dental profession.

In particular, there is one committee for which extreme care should be used in selecting personnel, and that is the committee or council on dental health. This is the only committee that routinely meets the public—that contacts school groups, health authorities, and other lay and professional organizations. I do not mean to minimize the importance of the personnel of other important committees; however, I do want to emphasize that dental health education is most important, and care should be taken to assign persons with exceptional ability to this task.

Each state dental association should negotiate with the proper school authorities so that school children may be allowed to keep dental appointments during school hours. Many states have already done this, and inasmuch as there are approximately four million babies born each year and the schools are not able to provide enough graduating dentists each year, it is becoming increasingly necessary for the public and school authorities to cooperate with the individual dentists in this respect. I am sorry to say that some school authorities feel that dental appointments rank along with scout meetings, music lessons, horseback riding and dancing instructions.

The success or failure of many district and state programs, as well as national programs, depends on the selection of tactful, diplomatic, and interested personnel.

Another basic responsibility is cooperation with the state boards of dental examiners. In the vast majority of states there is splendid cooperation between the state dental association and the board of dental examiners. This cooperation should continue, because the primary responsibility of any state board of dental examiners is to protect the public.

I think that the records will show, particularly those of recent years, that the percentage of failure of applicants has been fairly low and the percentage of successful applicants has been very high. I know that each one of us appreciates having high ethical and legal standards, and most of all, we enjoy the privilege of policing ourselves rather than having other boards or lay groups police our profession. Having served on the Arkansas State Board of Dental Examiners, I recognize that the cooperation of the state dental association is most essential if any state board of dental examiners is to do a creditable job. I am confident that in the vast majority of instances, state boards are doing a fine job. I urge continued and close cooperation between these two organizations.

During the past year, I have made a number of speeches on professional ethics. I am a firm believer that this subject of professional ethics should be well taught in dental schools, and should be reviewed in our literature and on our state programs periodically, because under the stress of modern day living, some of our members develop little traits or characteristics that are not in the best interests of the public or the profession. The public looks to the dental association to maintain high ethical standards. The vast majority of dentists are cognizant of their professional and moral responsibilities and discharge them well.

One of the very serious problems that is facing the public and the dental profession today is that of dental specialties. One of the main projects of the American Dental Association—and we have spent many thousands of dollars in this endeavor which I support very strongly—is that of educating the American public to seek more and better dental services.

Being a practicing specialist, and also I hope a practical specialist, I am aware of some of the problems faced by some

of the specialties. I am also aware of some of the attitudes that a small but sometimes vocal minority of our specialists have toward the problems of the general practitioner.

Most dental specialists are fine, cooperative dentists who participate in local, district and state dental conventions and are concerned with the problems of the general practitioner because they realize that it requires general practitioners and specialists as well as other allied groups to make up the dental health team.

As I have stated earlier, I believe very strongly that we are all dentists before we become specialists, and although we owe allegiance to our component and national specialty organizations, we actually owe our basic allegiance to our local and state associations and the American Dental Association.

I have very little patience with any specialty board that establishes unreasonable requirements for a dentist to become a diplomate of that board. All of us are aware that facilities at the various dental schools are not adequate to take care sufficiently of all of those qualified applicants that wish to take graduate or postgraduate training courses. As you know, none of such courses have been approved by the American Dental Association's Council on Dental Education. On the other hand, neither have they been disapproved. The reason that no action has been taken by the Association to date is that the problem is so vast that the Council on Dental Education has not had an opportunity to set up standards for such courses—standards with regard to the subjects and technics to be taught, the length of training and whether such training should be on a full-time or part-time basis.

It makes little sense to me for any Board to set impractical requirements, to demand enrollment in courses that have not been approved, and then to have a high percentage of failures, when the American Dental Association is doing its utmost to educate the public to more and better dental services of all types. I have attempted for several years to learn more about the activities of all dental specialty boards—some have been very cooperative, some very uncooperative.

A notable trend in the past few years has been the desire, which is very creditable, for postgraduate training not only for specialists but for practitioners of general dentistry. G. V. Black once said, "The professional man has no right to be other than that of a continuous student."

This postgraduate training has been on the increase, in dental schools and in local and state dental organizations who sponsor outstanding clinicians either at their regular or specially conducted sessions.

Another serious problem is the plight of the dental schools. More money needs to be provided, but where is the source from which it will come? Dental education now is the most expensive of all of the professions. There is usually a fairly strong liaison between the state dental association and the dental school or schools in that state. Good liaison can reduce to a minimum dissatisfaction and misunderstandings that sometimes occur. It is important for those states that do not have dental schools to consider the plight of the dental schools along with those states that have dental schools within their borders.

Space does not permit me to discuss other important problems that face all of us who are in positions of leadership. Only through cooperative efforts can scientific and administrative progress be made.

By and large, our Association is truly a democratic organization, whether on a district, state, or national level. I do not find fault with the individual who believes other than I; but when the outcome is decided by democratic processes, I believe that each one of us should be a loyal, conscientious member and should

work wholeheartedly toward the goals of the Association and never be a party to any movement that would discredit our profession, not only in Congress, but with any other group as well. Someone very wisely said a long time ago "only in unity is there strength."

National problems, oftentimes, are only state problems on a broader scale.

Leadership should be based on experience, devotion to duty, a realization of the rights of others, fairness, and a determination to serve the highest ideals of our profession. The responsibilities are ours—together we will continue to discharge our professional and moral obligations as a major health profession.

Boyle Building

Comprehension of Human Beings • To understand human beings it is essential to think of them as parts of the whole living world. Humanity depends not only on the complex biologic structure which has been developed through the ages from simple beginning, but on the great social inventions which have been made by human beings, are perpetuated by human beings, and in turn give human beings their stature and characteristics as builders, thinkers, scientists, artists, seers and prophets. Each of these inventions—language, family, use of tools, government, science, art and philosophy—has the quality of so combining the potentialities of every human temperament, that each can be learned and perpetuated by any group of human beings, regardless of race, and regardless of the type of civilization within which their progenitors lived, so that a newborn infant from the most primitive tribe in New Guinea is as intrinsically capable of graduation from Harvard, writing a sonnet or inventing a new type of radar as an infant born on Beacon Hill. Once a child has been reared in New Guinea or Boston or Leningrad or Tibet, he embodies the culture within which he is reared, and differs from those who are reared elsewhere, so deeply, that only by understanding these differences can we reach an awareness which will give us a new control over our human destiny.

Human nature is neither intrinsically good nor intrinsically evil, but individuals are born with different combinations of innate potentialities, and therefore, it will depend more on how they are reared—to trust and love and experiment and create, or to fear and hate and conform—than on what kind of human beings they can become. We have not even begun to tap human potentialities, but by a continuing humble but persistent study of human behavior, we can learn consciously to create civilizations within which an increasing proportion of human beings will realize more of the similarities and dissimilarities between man and his fellow man.

Human life is given meaning through the relationship which the individual's conscious goals have to the civilization, period, nation and country within which one lives. At times the essential task may be to fence a wilderness, bridge a river, study and heal a disease, or rear sons to perpetuate a young colony. Today it means taking upon ourselves the task of creating one world in such a way that we will keep the future safe and leave the future free. *Margaret Mead, A New Control of Destiny, 1952.*

Cases and Comments

THE ART IN CASTING A HOLLOW PONTIC

By A. H. Tamarin, D.D.S., Chicago.

The hollow pontic has its place in dentistry. It makes an ideal pontic for both fixed and removable bridgework.

Hollow pontics can be cast either singly or in multiple. The casting provides a layer of gold 0.05 mm. thick all around the pontic except for the occlusal surface which should be from 1 to 1.05 mm. thick. The buccal surface is left completely open for esthetic reasons. With the buccal surface open, the pontic or pontics resemble an open basket. Through this opening the acrylic material is deposited, to make the pontic completely solid as well as esthetic. Hollow pontics prevent the waste of precious metal, and are considerably lighter with no sacrifice of strength or beauty. The hollow pontic also provides the most efficient anchorage for acrylic facings. The bulk of the acrylic material helps, to a certain extent, to retain the material's original color. Hollow pontics can be used both in fixed and removable bridgework.

In multiple castings, a metallic wire can be adapted to the extreme mesial and distal surfaces of the pontics and later soldered to the abutments. This metallic wire is placed centrally between the gingival ridge and the occlusal plane, and parallel to them. The wire provides more firmness and stability to the pontics, and helps retain the acrylic material. The following technic is recommended for the construction of a hollow pontic.

25 East Washington Street

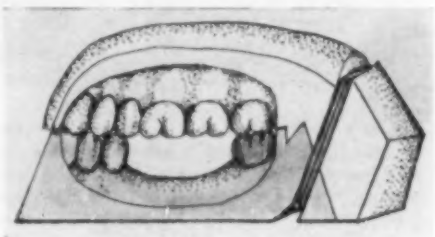

Fig. 1 • An impression is taken with the abutments in position and a cast made with investment compound. An impression of the opposing teeth is also made, together with a wax bite, and a plaster cast obtained. The two casts are articulated.

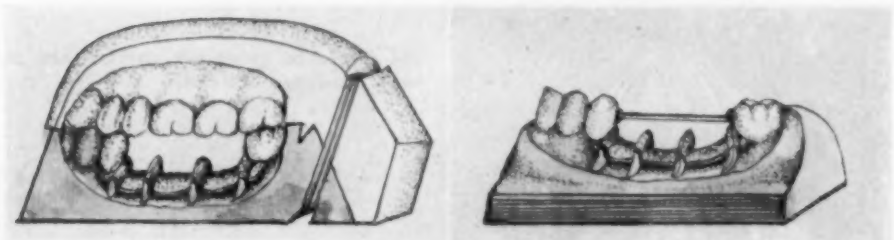

Fig. 2 • On the ridge between the abutment teeth, V-shaped lines are made, reproducing the interproximal spaces. The entire ridge is covered with a strip of 30 gauge wax, adapted to the surface. With a wax spatula some molten wax is applied on the mesial and distal surfaces of the abutment teeth to a thickness of about 1 mm. A piece of clasp wire corresponding to the distance between the two abutments is cut, warmed slightly and introduced directly into the center. This wire should rest midway between the alveolar ridge and the occlusal plane.

Fig. 3 • A piece of baseplate wax the same length as the wire is cut, with a height ranging from the gingival ridge to the occlusal plane. The wax is molded to resemble the lingual aspect of the missing teeth. This piece of wax is placed lingually in an erect position on the model, and united to the base of the ridge with a wax spatula.

Fig. 4 • The occlusal cusps of the missing teeth are formed from pieces of baseplate wax, mounted occlusally in their proper position, and united to the lingual wall as well as to each other. The three wax walls form a basket-like appearance, with the opening facing buccally.

Fig. 5 • Some investment compound is mixed and vibrated into the wax basket. Before crystallization takes place, a brass wire, bent to form a handle-like projection, is inserted.

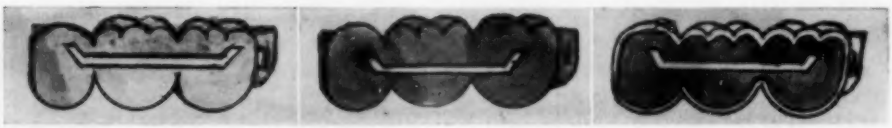

Fig. 6 • Left: After the investment compound has crystallized, the wax cusps are removed and the model is placed in hot water. This causes the wax to melt away, leaving a solid block of investment compound with a wire handle projecting buccally, and with two tips of the central wire projecting mesially and distally. The use of this central wire is optional. Center: The investment compound block is saturated with water, placed in a dish of molten wax and withdrawn instantly. This process gives a uniform layer of wax all over the investment. Right: The block of investment compound is placed on the articulating model. The wax on the buccal and occlusal surfaces is cut away with the point of a sharp knife. The wax cusps are replaced in their proper position on the occlusal surface and sealed completely.

Fig. 7 • The sprues are attached and the work is invested and cast.

Fig. 8 • In removable bridgework the wax clasps are designed and waxed up on the abutment teeth and the block of investment compound is placed between them and united to them with wax. The work is now cast in one piece. In fixed bridgework, the pontics are cast separately and then placed between the abutments and soldered to them.

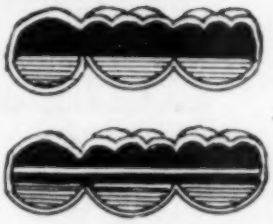

Fig. 9 • The completed castings, with and without the center wire.

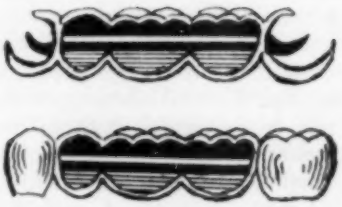

Fig. 10 • The bridges with hollow pontics.

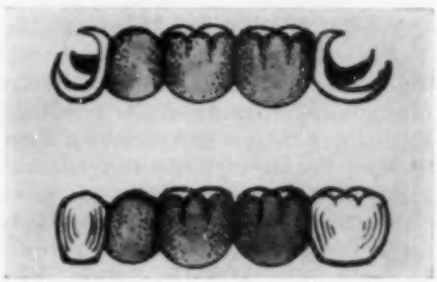

Fig. 11 • A bridge with the hollow pontics waxed up.

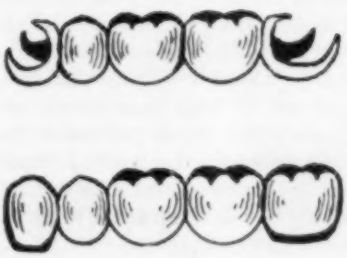

Fig. 12 • The finished bridge with the hollow pontics completely filled in with acrylic material.

COUNCIL ON DENTAL EDUCATION

Educational requirements and a program of certification for dental laboratory technicians

During its annual session in Miami Beach on November 4-7, 1957, the House of Delegates of the American Dental Association considered and approved a new set of educational requirements for dental laboratory technicians and the basic requirements under which a program for the certification of dental laboratory technicians will be developed. Both of the recommendations submitted by the Council on Dental Education were developed through a series of meetings of representatives of the dental profession and the dental laboratory craft in response to an action by the American Dental Association House of Delegates in October 1956 requesting the Council on Dental Education to study the desirability of developing "Requirements for the Approval of Certification Boards for Dental Auxiliaries" under which an acceptable program for the certification of dental laboratory technicians might become possible. A more comprehensive report on the details of the educational standards and the certification proposal that have now been approved by the House of Delegates will be published in an early issue of THE JOURNAL, but the Council believes that these programs are of such importance and significance to the dental profession that this brief report on the general framework of the programs should be brought immediately to the attention of all members of the Association.

Since 1948, the American Dental Association has had approved educational requirements for dental laboratory technicians, thus indicating the fundamental principle that the dental profession has an official interest in the education of the dental laboratory technician. Partially as a result of its study of the type of program that might be developed for the certification of dental laboratory technicians and partially as the normal result of the periodic review which the Council makes of all of its educational standards, it became apparent that some basic changes were needed in the requirements for the training of dental laboratory technicians. Out of this realization and with the consultation of the representatives of the National Association of Dental Laboratories, the Council developed a new set of educational standards for dental laboratory technicians.

Basically, the new educational standards provide for a program consisting of two parts. The first part is one academic year in length and will include instruction in the basic principles and philosophies associated with the responsibilities of all dental laboratory technicians and the fundamental knowledge and abilities needed by the student to engage in laboratory work. This first year of instruction may be offered in a vocational school, a technical school, a junior college or a dental school. The second part of

the program is a full calendar year of study and experience which will usually be conducted in a dental laboratory. This second year will be a form of on-the-job training, thereby making it possible for the student to earn as he learns and develops the skill that he will need when he goes into the craft. The new requirements approved by the House of Delegates include standards for the conduct of both parts of the training program.

The Council on Dental Education, which has been delegated the responsibility for accreditation of dental schools and schools in related fields of dental education, will be responsible for the evaluation and accreditation of all parts of this new educational program and will prepare listings of the academic institutions and the dental laboratories that have been recognized as training centers for dental laboratory technicians.

The House of Delegates also approved the basic plan for a certification program for dental laboratory technicians by approving the *Requirements for the Approval of a Certification Board for Dental Laboratory Technicians.* The certification program is very closely related to the educational standards for dental laboratory technicians by virtue of the fact that the candidates for certification, after the initial waiver period, will be required to have completed the educational program prescribed in the educational requirements approved by the House of Delegates. In addition, both the educational requirements and the plan for certification are based upon carefully developed definitions of the functions of dental laboratory technicians. In developing both of these programs, it has been the view of the Council on Dental Education that there is no single definition that correctly and adequately describes all dental laboratory technicians. Instead, there appear to be at least five different kinds of technicians. It is expected that an individual would be eligible for certification in any one or more of the described areas provided he can prove his competence. For example, there will be educational programs for five different kinds of dental laboratory technicians, and there will also be five different certificates which can be earned by training, experience and examination. These five educational programs and areas for certification are:

1. Generalist (general laboratory technician)
2. Dental laboratory technician in full denture fabrication
3. Dental laboratory technician in partial denture fabrication
4. Dental laboratory technician in ceramic technic
5. Dental laboratory technician in crown and bridge technic

The technician who qualifies for the Generalist certificate will usually be one who is a supervisor in a laboratory or one who works in several or all of the fields. His basic education will be similar to that of the others but he will have basic knowledge also of all of the fields, such as full denture fabrication and work in ceramics. The technician who qualifies for the certificate in full denture fabrication will also have the same background as the others, but he will have had his major practical training and experience concentrated in the specific field of full denture fabrication.

The Certification Board will be an agency of the National Association of Dental Laboratories operating under rules and regulations established by it and approved by the Council on Dental Education in accordance with the *Requirements for the Approval of a Certification Board for Dental Laboratory Technicians.* The Certification Board of the National Association of Dental Laboratories will be responsible for the administration of the program, including such matters as the preparation and distribution of applications, the developing of examinations and the issuing of certificates to successful candidates. The Coun-

cil on Dental Education will receive periodic reports on the conduct of the program and will maintain a close interest in the rules and regulations of the Certification Board to assure their continued agreement with the requirements approved by the House of Delegates.

The Certification Board, as an agency of the National Association of Dental Laboratories, is scheduled to begin work immediately on the development of by-laws and operating procedures for the certification program. It will work closely with the Council on Dental Education in developing some of the details of the program. At the outset of the certification program, it is expected that some parts of the examination will be waived in view of the extensive experience that many dental laboratory technicians have had in the field.

Persons interested in a more detailed description of the educational standards and certification plan for dental laboratory technicians may refer to pages 63 to 76 of the *1957 Reports of Officers and Councils*. Copies of the *Requirements for the Approval of Educational Programs for Dental Laboratory Technicians* and the *Requirements for the Approval of a Certification Board for Dental Laboratory Technicians* may be obtained from the Council on Dental Education. As mentioned earlier in this report, additional explanation of the certification plan and the benefits which this program may be expected to have for the dental profession and the dental laboratory craft will be presented in future Council reports in THE JOURNAL.

Acknowledgment should be given to the wholehearted cooperation and assistance given by the National Association of Dental Laboratories in the development of the new educational standards and the basic plan for the certification of dental laboratory technicians. At its recent annual meeting in Dallas, the National Association of Dental Laboratories expressed its support of both of these programs and its assurance of continued cooperation with the dental profession in the effective development of both of these important activities.

COUNCIL ON DENTAL RESEARCH

Supplement to list of certified dental materials

ADDITIONS • Since the publication of the most recent List of Certified Dental Materials, revised to December 1, 1956 (J.A.D.A. 54:130 Jan. 1957), the following materials which conform to American Dental Association Specification No. 2 for Inlay Casting Investments, Specification No. 5 for Dental Inlay Casting Gold Alloys and Specification No. 6 for Certified Dental Mercuries have been added.

CERTIFIED DENTAL INLAY CASTING INVESTMENTS
(A.D.A. SPECIFICATION NO. 2)

Investment	*Manufacturer or distributor*
Cristo-Vest	The Ransom & Randolph Company

CERTIFIED DENTAL INLAY CASTING GOLD ALLOYS
(A.D.A. SPECIFICATION NO. 5)
TYPE B, MEDIUM

Alloy	*Manufacturer or distributor*
J-8	J. F. Jelenko & Co., Inc.

CERTIFIED DENTAL MERCURIES
(A.D.A. SPECIFICATION NO. 6)

Alloy	*Manufacturer or distributor*
Chemically Pure	Stratford-Cookson Co.

SURVEY • From time to time, products on the List of Certified Dental Materials are tested for continued compliance with American Dental Association specifications.

Samples of the certified dental amalgam alloys were tested by the American Dental Association Research Division at the National Bureau of Standards under the supervision of that Bureau. The following certified materials were found to comply with the specification. This list supersedes that published in the January 1957 issue of THE JOURNAL.

CERTIFIED DENTAL AMALGAM ALLOYS
(A.D.A. SPECIFICATION NO. 1)

Alloy	*Manufacturer or distributor*
Abner Fine Cut; Oxford	Abner Alloys Co.
Accurate Metalloy (filings)	The L. D. Caulk Co.
Ames Alloy Quick Setting	The W. V-B. Ames Co.
Argentum "A" cut; fine cut; medium cut	Hammond Dental Mfg. Co.
Aristaloy	Baker & Co., Inc.
Banner (filings)	Goldsmith Bros. Dental Co.
Baring (improved fine cut)	Baring Smelting & Refining Co.
Brewster Medium	Brewster Laboratories
Certified Non-Zinc	Lee Smith Co.
Cresilver	Crescent Dental Mfg. Co.
Dee (filings)	Kerr Mfg. Co.
Fellowship	Dental Protective Supply Co.
Filling Alloy, fine grain	Abe Bass
Fleck's	Mizzy, Inc.
Garfield's	Garfield Smelting & Refining Co.
Gem	Certified Dental Supply Corp.
Gold Bond	Jefferson Dental Supply Co.
H & M Special	Hauser and Miller
Linc Alloy	Lincoln Dental Supply Co.
Lustraloy Regular	Pfingst & Co.
Midvalloy	Midvale Dental Supply Co.
Minimax (filings) 173; 177; 178; 178 non zinc; 178 fine cut; 183; White Gold & Platinum; (shavings) 177; 178	The Minimax Co.
Mission No. 5; No. 5 "A" Cut	Henry F. Bruce Co.

Modeloy (quick setting filings)	Crescent Dental Mfg. Co.
Mynol Improved	Mynol Chemical Co.
National Dental	Eskay Dental Products
New Deal	Miller Dental Co.
Oceanic Filling Alloy	Oceanic Chemical Co., Inc.
Odontographic "Improved" (filings)	Odontographic Mfg. Co.
Pearlol	Wildberg Bros. Smelting & Refining Co.
Peerless	Herbert D. Damsky
Precision	Precision Bur Co.
Research Oralloy	Precious Metals Research Works, Inc.
Royal Super First Setting	Garhart Dental Specialty Co.
Safco 69	Safco Laboratories
Silver Crown Fast; Medium; Slow; non Zinc; Fine Cut; Fine Cut non Zinc	General Refineries, Inc.
Silverloy (filings); F.C. #20 for Proportioner; (shavings)	Crescent Dental Mfg. Co.
Speyer	Speyer Smelting & Refining Co.
S-C Medium (filings)	Stratford-Cookson Co.
Standard	Standard Dental Products Co.
Stratco	Edward P. Stratt
Tri-Alloy	Tri-Boro Dental Supply Co., Inc.
True Dentalloy (filings); Cut "A"; New	The S. S. White Dental Mfg. Co.
Twentieth Century Regular; Special; Fine Cut; Non Zinc; Micro; Micro Non-Zinc (filings-pellets)	The L. D. Caulk Co.
Ultra Brand; Fast Setting; Regular; 72% Silver	H. Jelinek Dental Alloys
White Beauty; Fine Cut	Lang Dental Mfg. Co.
Yates Balanced	J. Yates Dental Mfg. Co.

DELETION • The American Dental Association, Research Division, National Bureau of Standards, has been advised by the manufacturer of the material listed below that this product has been withdrawn from the market and, therefore, it should be eliminated from the List of Certified Dental Materials.

CERTIFIED DENTAL ZINC PHOSPHATE CEMENTS
(A.D.A. SPECIFICATION NO. 8, FIRST REVISION)

Cement	*Manufacturer or distributor*
Petroid Improved	The L. D. Caulk Co.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Changes in the distribution of dentists during 1954-1956

Each year since 1953 the Bureau of Economic Research and Statistics has published a booklet entitled *Distribution of Dentists in the United States by State, Region, District and County.* The booklet is sent to all senior and junior student members of the Association, and to hundreds of dentists seeking new locations. It is believed that many dentists are influenced in their choice of a location by the data contained in this booklet.

In 1955 a study was made of the year-to-year changes in the distribution of dentists during the period 1952-1954, based on the first three editions of the booklet.[1] The study clearly indicated that the distribution of dentists, though still uneven, became more uniform from 1952 to 1953 and again from 1953 to 1954. The "leveling" of population-dentist ratios occurred in all geographic units studied: counties, districts, regions and states.

The present study is a continuation of the 1955 study. An analysis of changes in population-dentist ratios of counties, districts, regions and states during the period 1954-1956 is presented.

Tables 1 and 2 and Figures 1 and 2 show that a high percentage of counties with large population-dentist ratios in 1954 and 1955 experienced reductions in those ratios in the succeeding year. For example, 66.4 per cent of the counties with more than 10,000 persons per dentist in 1954 improved their supply of dentists in 1955. Eighty-four per cent of such counties made improvement from 1955 to 1956.

1. Bureau of Economic Research and Statistics. Changes in the distribution of dentists during 1952-1954. J.A.D.A. 51:481 Oct. 1955.

Table 1 • Percentage of counties in which population-dentist ratio in 1955 was higher, lower or the same as in 1954, according to the 1954 ratio

1954 ratio	Percentage of counties			
	Same ratio in 1955	Higher ratio in 1955	Lower ratio in 1955	Total
Under 1,500	6.6	51.6	41.8	100.0
1,500–1,999	5.6	44.6	49.8	100.0
2,000–2,499	6.8	40.2	53.0	100.0
2,500–2,999	6.7	44.5	48.8	100.0
3,000–3,999	6.9	34.3	58.8	100.0
4,000–4,999	6.1	36.1	57.8	100.0
5,000–5,999	6.8	30.5	62.7	100.0
6,000–6,999	7.7	25.6	66.7	100.0
7,000–7,999	8.6	37.1	54.3	100.0
8,000–8,999	4.7	21.9	73.4	100.0
9,000–9,999	10.0	15.0	75.0	100.0
10,000–	3.2	30.4	66.4	100.0
No dentists	94.5	. . .	5.5	100.0
All counties	13.2	35.9	50.9	100.0

Table 2 • Percentage of counties in which population-dentist ratio in 1956 was higher, lower or the same as in 1955, according to the 1955 ratio

1955 ratio	Percentage of counties			
	Same ratio in 1956	Higher ratio in 1956	Lower ratio in 1956	Total
Under 1,500	7.0	58.3	34.7	100.0
1,500–1,999	7.1	45.9	47.0	100.0
2,000–2,499	6.7	42.2	51.1	100.0
2,500–2,999	6.4	39.9	53.7	100.0
3,000–3,999	5.8	35.5	58.7	100.0
4,000–4,999	4.3	33.0	62.7	100.0
5,000–5,999	8.7	20.9	70.4	100.0
6 000–6,999	4.5	24.1	71.4	100.0
7,000–7,999	5.5	13.7	80.8	100.0
8,000–8,999	8.2	19.7	72.1	100.0
9,000–9,999	.1	28.1	68.8	100.0
10,000–	3.4	12.6	84.0	100.0
No dentists	91.0	. . .	9.0	100.0
All counties	12.7	35.0	52.3	100.0

Among counties with more favorable population-dentist ratios, a smaller percentage experienced improvement from one year to the next. Among counties with the best existing ratios, less than 1,500 persons per dentist, the majority experienced a decrease in the supply of dentists.

It will be noted that nine out of ten counties with no dentists in 1954 or 1955 were also without dentists the succeeding year. In most cases these are counties with extremely low populations, extremely poor economy, or both. It is probably true that most counties without dentists are unable to support a dentist.

Another method of measuring the degree of uniformity in population-dentist ratios is by the standard deviation of the ratios. The standard deviation is a measure of the absolute dispersion or "scatter" of values about the mean value. If population-dentist ratios for all counties were the same, the standard deviation of county ratios would be zero. The standard deviation is calculated by summing the squares of the deviations of individual values from the mean value, dividing by the number of values and extracting the square root of this quotient.

The standard deviation of population-dentist ratios became lower from 1954 to 1955 and again from 1955 to 1956 (Table 3). This was true of all geographic units—counties, districts, regions and states.

A measure of relative dispersion, the

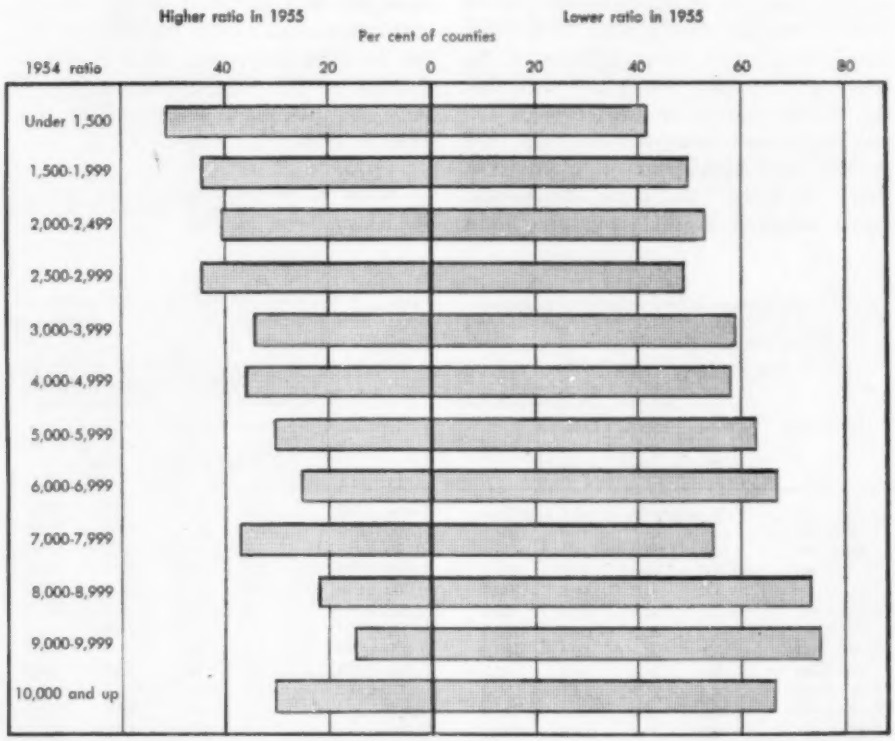

Fig. 1 • Percentage of counties in which population-dentist ratio was higher or lower in 1955 than in 1954, according to 1954 ratio

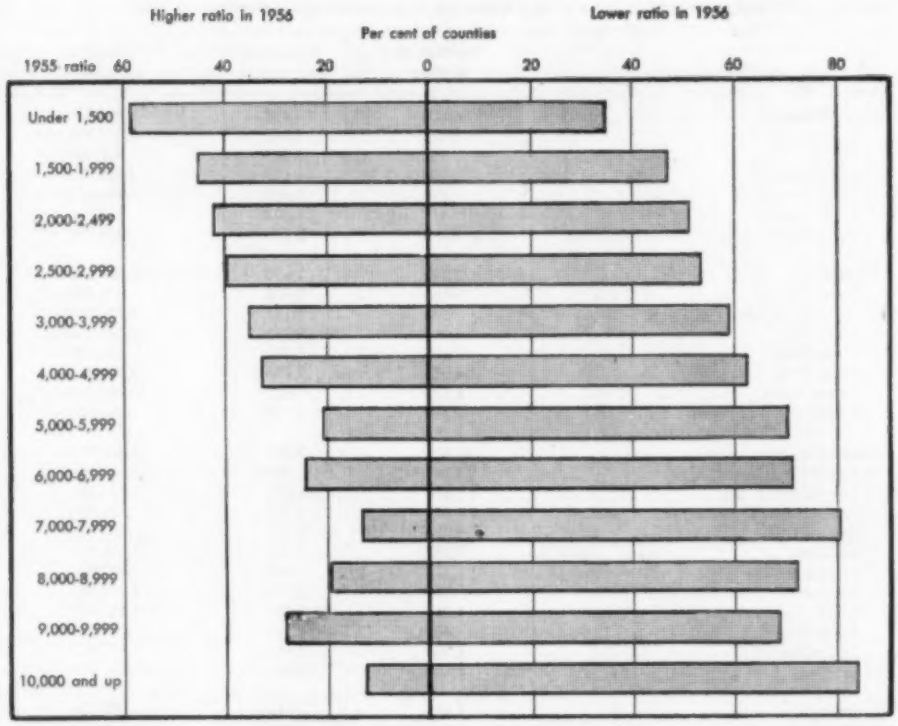

Fig. 2 • Percentage of counties in which population-dentist ratio was higher or lower in 1956 than in 1955, according to 1955 ratio

coefficient of variation, is also presented in Table 3. The coefficient of variation is obtained by dividing the standard deviation by the mean and multiplying by 100. In general, the trend established by other measures was borne out by the coefficient of variation. There were two minor exceptions: the coefficient of variation for counties and states was slightly higher in 1955 than in 1954. This increase, however, was far more than offset by the decrease between 1955 and 1956.

By combining the results of the current study and the 1955 study, an unmistak-

Table 3 • Measures of dispersion of population-dentist ratios, by county, district, region and state

	1954			1955			1956		
	Standard deviation	Mean ratio	Coefficient of variation	Standard deviation	Mean ratio	Coefficient of variation	Standard deviation	Mean ratio	Coefficient of variation
County	3,063	3,815	80.3	3,027	3,751	80.7	2,836	3,653	77.6
District	1,808	3,081	58.7	1,707	3,013	56.7	1,648	2,960	55.7
Region	1,002	2,446	41.0	960	2,398	40.0	926	2,376	39.0
State	865	2,263	38.2	840	2,176	38.6	794	2,153	36.9

Table 4 • Distribution of dentists in the United States and its territories and possessions in 1956

Region and state	Number of dentists	Population per dentist	Estimated population
New England	6,605	1,498	9,894,300
Connecticut	1,676	1,369	2,294,500
Maine	452	2,008	907,500
Massachusetts	3,500	1,409	4,932,000
New Hampshire	290	1,885	546,600
Rhode Island	517	1,609	832,000
Vermont	170	2,245	381,700
Middle East	27,229	1,410	38,399,500
Delaware	153	2,471	378,000
District of Columbia	778	1,127	876,800
Maryland	1,145	2,395	2,742,700
New Jersey	3,632	1,510	5,484,000
New York	14,038	1,138	15,969,600
Pennsylvania	6,773	1,622	10,982,800
West Virginia	710	2,768	1,965,600
Southeast	11,487	2,990	34,348,900
Alabama	881	3,549	3,126,500
Arkansas	519	3,579	1,857,300
Florida	1,825	2,058	3,756,400
Georgia	1,054	3,502	3,691,000
Kentucky	1,082	2,785	3,013,300
Louisiana	1,127	2,654	2,990,800
Mississippi	586	3,718	2,178,900
North Carolina	1,251	3,467	4,337,400
South Carolina	482	4,767	2,297,900
Tennessee	1,380	2,466	3,403,000
Virginia	1,300	2,843	3,696,400
Southwest	4,445	2,944	13,087,100
Arizona	358	2,986	1,069,000
New Mexico	229	3,580	819,900
Oklahoma	871	2,604	2,268,300
Texas	2,987	2,990	8,929,900
Central	25,567	1,701	43,478,400
Illinois	6,233	1,513	9,428,800
Indiana	2,121	2,049	4,345,000
Iowa	1,685	1,580	2,662,200
Michigan	3,706	1,958	7,256,500
Minnesota	2,322	1,364	3,166,600
Missouri	2,461	1,697	4,176,600
Ohio	4,511	1,945	8,774,200
Wisconsin	2,528	1,451	3,668,500
Northwest	4,776	1,829	8,734,900
Colorado	906	1,729	1,566,200
Idaho	308	2,015	620,700
Kansas	1,019	2,084	2,124,100
Montana	341	1,877	639,900
Nebraska	942	1,468	1,382,400
North Dakota	284	2,204	626,000
South Dakota	313	2,146	671,700
Utah	504	1,561	786,900
Wyoming	159	1,994	317,000
Far West	11,877	1,504	17,868,400
California	8,668	1,537	13,321,700
Nevada	119	1,958	233,000
Oregon	1,245	1,365	1,699,500
Washington	1,845	1,417	2,614,200
Total number listed by state	91,986		

Region and state	Number of dentists	Population per dentist	Estimated population
Federal Dental Services	7,241		
Air Force	2,056		
Army	2,282		
Navy	1,718		
Public Health Service	268		
Veterans Administration	917		
United States	99,227	1,671	165,811,500
Territories and Possessions			
Alaska	52	3,096	161,000
American Samoa	1	21,000	21,000
Guam	5	15,000	75,000
Hawaii	341	1,543	526,000
Marshall Islands	1	12,000	12,000
Panama Canal Zone	11	3,545	39,000
Puerto Rico	305	7,397	2,256,000
Virgin Islands	5	4,800	24,000

Sources: Number of dentists is based on a count of dentists listed in the 1957 American Dental Directory as of mid-1956. Retired dentists are included. Populations of states and regions are estimates as of January 1, 1956, from Sales Management, May 10, 1956. Populations of Alaska, Hawaii and Puerto Rico are estimates as of July, 1956, from Current Population Reports, Population Estimates, Series P-25, No. 148, Bureau of the Census, November 18, 1956. Populations of Panama Canal Zone and Virgin Islands are estimates as of July 1, 1955, Series P-25, No. 145, October 19, 1956. Populations of American Samoa, Guam and Marshall Islands are estimates as of January 1, 1955, from Gazetteer Index of Rand McNally Commercial Atlas, 88th edition, 1957.

able trend toward better distribution of dentists is noted for the period 1952-1956. During this four year period, coefficients of variations were reduced as follows: counties from 85.2 to 77.6; districts from 67.9 to 55.7; regions from 43.9 to 39.0, and states from 41.9 to 36.9.

The distribution of dentists by state in 1956 is shown in Table 4. Each of the 15 states in the Southeast and Southwest regions, which for years have had the greatest number of persons per dentist, improved its ratio between 1955 and 1956. Among the remaining 33 states, 20 experienced increases in population per dentist.

The booklet *Distribution of Dentists in the United States by State, Region, District and County* may be obtained on request to the Bureau of Economic Research and Statistics. In addition to information on the distribution of dentists and population, it contains information on population growth, per capita income and per capita retail sales by county, district, region and state.

BUREAU OF LIBRARY AND INDEXING SERVICE

Additions to the Library

The books listed here have been added recently to the Library collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing these books. Most of these books may be purchased through the Bureau. Practically all the dental journals published in the world are available also to members on loan.

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The American Dental Association Film Library

The film, "Root Resection," reviewed in this article, is one of the films which can be rented for $2.50 from the Film Library. Additional films on this subject and films and slides on other subjects for professional and nonprofessional use are listed in the booklet, *Audio-Visual Materials in Dentistry,* and its supplements I and II, which are available free of charge from the Film Library.

Slides are needed on the subject of crowns and bridges. If any readers have a series of 40 slides with a commentary and before and after roentgenograms, information about these slides will be appreciated. Please communicate with the Film Library so that these may be called in for preview.

FILM REVIEW

Root Resection • 16 mm., color, sound, 15 minutes. Produced in 1954 by Martin Entine, D.D.S., chief, department of dentistry, Kensington Hospital, Philadelphia. Photography by Borneman Productions, Philadelphia. Purchase arrangements can be made with the producer, 3037 N. Broad St., Philadelphia 32.

This film shows the steps involved in an immediate root resection. Preoperative roentgenograms show an apical abscess. Local anesthesia is obtained by infraorbital injection. The root canal is opened from the lingual aspect of the tooth and is reamed and filled. A V-shaped incision is made in the area in which the root resection will be done and the overlying bone is removed. The periapical abscess is then excised and the region flushed from the lingual aspect of the tooth. The excess gutta-percha point is removed through the area of operation, and the apex is sealed with a hot instrument. The V-shaped flap is returned to position and sutured. Postoperative roentgenograms taken at intervals of one week, two weeks, and six months, indicate satisfactory results.

This film is well photographed and organized. It is suitable for showing to dental societies and other professional groups as well as to general practitioners and dental students.

JANUARY 1958

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

LON W. MORREY, D.D.S., EDITOR
VOLUME 56 • NUMBER 1
Published by the American Dental Association
222 East Superior Street • Chicago 11, Illinois

Editorials

Safety of dental roentgenography assured by modern technics and equipment

Now that the initial wave of concern caused by the report of the National Academy of Science on the effects of radiation on human health has subsided and researchers have had an opportunity to investigate the various dangers attributed to the taking of dental roentgenograms, it appears that the dangers are far less than at first supposed.

At a meeting of the Council on Dental Research of the Association November 22, 1957, that agency, after restudy of all the evidence at hand, issued the following reaffirmation of policy regarding radiation hygiene:

> The Council on Dental Research of the American Dental Association reaffirms its belief that there is no justification for undue concern by patients undergoing x-ray examinations of the teeth and jaws.
>
> X-ray examinations are an essential aid in dental care. The curtailment of such examination in oral health service would handicap the dentist and impair proper diagnosis and treatment planning.
>
> Millions of x-ray examinations have been made by dentists without a report of injury to a patient. Recent research has shown that x-ray examinations of the teeth now can be made with even less radiation when the x-ray beam is properly filtered, centered with a lead diaphragm, and when super-speed film, increased kilovoltage and longer developing time are used.

The assurance of the Council on Dental Research came hard on the heels of two other statements of assurance issued during the recent Miami meeting of the Association. The first of these statements was issued by five of the nation's better known authorities concerned with the subject after their participation in a panel discussion

on "X-radiation in the Dental Office." The five authorities are: Albert G. Richards, M.S., moderator, Berwind P. Kaufmann, Ph.D., William O. Caster, Ph.D., E. Dale Trout, D.Sc., and Robert J. Nelsen. Their assurance is contained in the following statement:

1. Exposure of the human body to x-ray radiation is biologically undesirable and should be kept to the lowest possible level without sacrificing the essential uses of radiation in diagnosis and therapy.
2. Dental radiographs are an indispensable diagnostic aid in the maintenance and care of the teeth, which in turn contribute greatly toward the preservation and improvement of the health of the individual.
3. An x-ray examination of the entire mouth can be made with ultra-fast films and a small, properly filtered x-ray beam, which exposes the patient's face to a total of 5 roentgens (with no one area of skin receiving more than 1.5 roentgens) and the reproductive cells to an effective tissue dose of no more than 0.0005 roentgens. The annual exposure of the face and reproductive cells by these amounts of radiation during an x-ray examination of the entire mouth constitutes a very minor genetic and biological hazard to the patient as compared with the potential benefits to the dental health of the patient.

A second and strongly corroborating statement on the subject was issued during the Miami meeting of the Association by the American Academy of Oral Roentgenology signed by the Academy's Committee on Radiation Protection: A. G. Richards, M.S., chairman; G. M. Fitzgerald, R. J. Nelsen, H. D. Spangenberg, Jr., and S. S. Wald.

The Academy's reassuring statement is as follows:

Concern, regarding the exposure of the population to x-ray radiation, has swung like a pendulum from the indifferent attitude of a few years ago to the present state of undue apprehension. This change in attitude has had both good and bad effects in dentistry.

The extreme concern displayed by some persons has led them to forego the obvious benefits of x-ray examinations of the teeth because of the remote possibility of some genetic or pathologic damage occurring. They ignore the accepted fact that dental radiographs are an indispensable diagnostic aid in the maintenance and care of the teeth, which in turn contribute greatly toward the preservation and improvement of the health of this and future generations.

The present awareness by the dentist of his role in the exposure of the population to x-ray radiation has stimulated research into new x-ray techniques which use radiation far more efficiently and reduce greatly the exposure of both the patient and the dentist.

Methods for producing complete dental x-ray examinations are available now that present no greater hazard to the patient's genetic system than does his minute daily exposure by cosmic rays and other naturally occurring radiation. No one has any concern regarding this small, unavoidable, daily exposure by this naturally occurring radiation because man has always been exposed by it and has survived quite successfully.

It is the conviction of the American Academy of Oral Roentgenology that, since dental x-ray examinations can be made with very small amounts of radiation when the most modern techniques are used, there should be no cause for concern regarding possible genetic damage or any other type of damage. The benefits of the judicious use of x-rays in dentistry far outweigh any possible biological consequences that might be involved.

These three assurances provided by three competent and highly respected bodies should enable the most retiring and inarticulate dentist, concerned with his patients' health, to counteract the unscientific advice offered by some newspaper columnists and other writers whose scientific education was obtained, not in the halls of science, but in a school of the writing arts.

American Medical Association study finds fluoridation safe

The long awaited report on fluoridation prepared by the Council on Drugs and the Council on Foods and Nutrition of the American Medical Association was approved by the House of Delegates—the policy-making body of the American Medical Association—at its 11th Annual Clinical Session December 5 (see page 138 of this issue).

This action of the American Medical Association reaffirms—in stronger language—the policy expressed by that organization in 1951 that: "The use of drinking water containing up to one part per million of fluoride is safe."

The present report states in part that "no evidence has been found since the 1951 statement by the councils to prove that continuous ingestion of water containing the equivalent of approximately one part per million of fluoride for long periods by large segments of the population is harmful to the general health."

Now that the nation's leading medical authorities have, once again, attested to the safety aspect of fluoridation and the country's leading dental authorities have vouched for its anticariogenic aspects—both of which properties also are recognized by leading public health authorities—there is no reason why any community, interested in the health and well-being of its children, should withhold from them the benefits of properly fluoridated drinking water.

Dentistry: its progress is international

Those of us who confine our reading of dental literature largely to articles contributed by American authors are inclined to overlook the fact that dentists in other countries also are constantly making valuable contributions to the profession. This oversight, which works to the detriment of American dentistry, was one of the reasons for the inauguration of DENTAL ABSTRACTS, the Association's latest periodical. It also is one reason for the international character of this issue of THE JOURNAL. Eleven of the fifteen scientific articles published this month have been contributed by authors from countries other than the United States.

Once previously, in May 1955, THE JOURNAL devoted an entire issue to articles contributed by authors from overseas. The favorable reaction created by that first venture is an additional reason for this second international issue. It is hoped that the pages of an occasional entire issue in the future can be devoted to articles by overseas authors. If by doing so THE JOURNAL can help break down insularity in dentistry, it will have contributed something toward bringing about better world understanding not only in dentistry but in other equally important fields as well.

International Correspondence

NEWS FROM GREAT BRITAIN

BRITISH DENTAL ASSOCIATION

The Representative Board met on October 25. This was the last meeting of the present Board and the last at which the chairman, W. R. Tattersall, presided. The agenda contained matters of the greatest importance to the Association, among which were:

Report of the Finances Review Subcommittee. The committee was set up to investigate the expenditure of the Association's income and to see if it would be possible to eliminate or reduce any of the costs. The report in general found no evidence of waste and little opportunity for economizing. The Board came to the decision that the only economy which would not reduce the efficiency of the Association or the service which it gave to members would be a slight reduction in the number of Board members.

In an editorial headed "Association Finance," dealing with this report, the concluding paragraph reads as follows:

"The outcome of all this is that the Association needs more money and that a special committee on which the rank and file of the membership was fully represented has investigated its finance and can see no way of effecting appreciable economy. Clearly, therefore, an increase in the annual subscription is inevitable and will have to be made in the near future."

Memorandum to the Royal Commission on the Remuneration of National Health Service Doctors and Dentists. This memorandum, presented to the Board by a special committee appointed by the Council, was 88 pages long and is probably the most comprehensive document which has ever been submitted by the Association to an official body. It is in ten parts and deals with every aspect of dentistry which is likely to be of value to the Commission.

The document draws the attention of the Royal Commission to the many injustices which the profession has suffered for a period of years and suggests remedies for them.

The Dental Health Committee. This body submitted an extensive memorandum on dental research in the United Kingdom. During the discussion of this memorandum, which was accepted with great appreciation by the Board, Professor Bradlaw stated that in his opinion the occasion was a landmark in the deliberations of the Association, and the members of the Board warmly applauded this comment.

PUBLIC DENTAL SERVICE

Dr. C. W. W. Jeremiah, principal school medical officer, in his annual report for 1956 to Nottinghamshire County Council devotes a considerable part of his introduction to the School Dental Service. Regretfully his comments, based on Principal Dental Officer D. E. Mason's report, refer to a deterioration of the general position. The scheme of routine dental care with preservation of children's teeth as its principal objective has become an emergency scheme for the alleviation of pain and sepsis.

For example, in 1931, emergency cases numbered 705; in 1956 this figure had risen to 9,284. This record indicates the serious deterioration which exists. One medical officer reports that out of 1,094 children inspected, 724 were suffering from obvious caries.

Dr. Jeremiah, though mindful of the increase of school population from 55,386 in 1931 to 89,200 in 1956, is forced to the conclusion that "conservation" has had to give way to "alleviation," and that there is little prospect of a reversal.

D. E. Mason, who has worked long and arduously for the betterment of the whole School Dental Service, must feel very depressed at present conditions not only in his own county of Nottinghamshire but almost all over Great Britain.

ROYAL COLLEGES

The Third Webb-Johnson Lecture. Sir Wilfred Fish gave the Webb-Johnson lecture on November 22 at the Royal College of Surgeons of England. It was an intensely interesting talk concerned with "An Enterprise in Dental Research," and outlined the present work and future program of the new department of dental science at the College, of which Sir Wilfred is the inspiring director.

Royal College of Surgeons of Edinburgh.

A statutory meeting of the Fellows in Dental Surgery was held in the hall of the college on October 9. Among other business, the composition of the Dental Council for the year 1957-8 was announced as follows: President, Professor John Bruce, C.B.E.; Convener, Dr. F. G. Gibbs; Secretary, Dr. W. Russell Logan, and members Professor A. C. W. Hutchinson, Mr. R. Marr Meldrum, Mr. Wm. R. Tattersall, Dr. J. Campbell, Dr. Wm. D. Maclennan, Professor A. D. Hitchin, and Mr. C. H. Kemball.

The meeting was preceded by a lecture on "Clinical Diagnosis in the Dental Chair" by Professor G. L. Roberts.

The General Dental Council. The Council has published a booklet entitled *Regulations of Dental Practice* which summarizes the different legal and educational requirements for the practice of dentistry in most countries of the world. The book contains interesting and sometimes surprising information. For example, over 60 countries or states will permit only their own citizens to practice dentistry, 24 restrict or deny the right of the dentist to use anesthetics, 80 allow practice by ancillary workers of one kind or another, and 20 say that there is no contravention or evasion in their countries of the laws regulating dental practice.

ITEMS OF INTEREST

Fluoridation. In the October 15 issue of the *British Dental Journal,* there is an article by C. G. Dobbs who is opposed to the fluoridation of public water supplies. It is explained that this is the only full-length article by an opponent of fluoridation which has been received and that there seems to be a dearth of writers willing, or able, to produce a scientific article against fluoridation. The editor is to be congratulated on his policy of presenting, if possible, all sides of any controversial problem, for this article does enable readers to be aware of the grounds on which the opponents of fluoridation base their arguments. It should not, of course, be interpreted as representing the views of the British Dental Association.

In the same *Journal* is a very interesting review by Messrs. Slack and Hartles of two books, *The Fight for Fluoridation,* by Donald R. McNeil, and *The American Fluoridation Experiment,* by F. B. Exner and G. L. Waldbott. To those interested in this important subject of fluoridation, this review will be of great interest.

A New Minister of Health. The Rt. Hon. Dereck C. Walker-Smith has been appointed Minister of Health, and the new Parliamentary Secretary to the Ministry of Health is Mr. Richard H. M. Thompson.

On October 25, a dinner was held at the Royal College of Surgeons of England in honor of the retiring chairman of the Representative Board, W. R. Tattersall. He had completed 11 years in office. There were about 120 people present who had been, or still were, members of the Board under Mr. Tattersall's chairmanship.

A.D.A. MEETING, MIAMI, NOVEMBER 1957

I feel I must include a note in this letter to wish the many old and new friends I met and made at the Miami meeting a very happy 1958.

I found the meeting magnificently organized and very instructive, and apparently many of the problems discussed in the House of Delegates were closely related to those in many countries of the world, especially in Great Britain where a national health service has been in existence for nearly ten years.

My gratitude is unbounded for the hospitality and kindness I received during my visit as an official guest of the American Dental Association, and I look forward to my next visit to your exciting and stimulating country which I hope will be in 1959 at the time of the celebration of the centennial meeting of the A.D.A. and the 47th annual meeting of the Fédération Dentaire Internationale.

There was obviously a very great interest in dental affairs and practice in Great Britain, and this will stimulate me to try and make these letters even more interesting during this new year of 1958.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

NEWS FROM ARGENTINA

On October 3, Argentina joined with other Latin American countries to celebrate Dentistry Day. Many meetings were held throughout the country in honor of the profession.

Another important event during October was the ceremony to commemorate the centenary of the birth of Professor Nicasio Etchepareborda, founder of the School of Dentistry of the University of Buenos Aires. After graduation as a physician from the University of Buenos Aires, Dr. Etchepareborda went to France to study dentistry at the Paris Dental School. During his lifetime, he taught several generations of dentists.

The first Public Dental Health Congress was held in Rosario, Santa Fe, from October 27 to 31. Organized by the Ministerio de Salud Pública and the Ayuda Social de la Provincia, it was attended by a number of delegates from all over the country. Lecture topics included philosophy and dental education, teaching of public dental health, administration, and control of various oral diseases.

Ricardo A. Crespi

NEWS FROM THAILAND

In January 1957, a group of dentists from various government agencies met to revise and draft modifications of the Dental Practice Act. The draft, after being submitted to the Committee on Common Practice for consideration, will be promulgated into law by the sanction of the House of Representatives. The main revision of the Act is the abolishment of registration of second class dentists and the acceptance instead of registration of dental hygienists under specified qualifications.

Through the aid of educational and public health funds in the amount of 500,000 bahts (about $25,000 U. S. currency), the Faculty of Dentistry has been utilizing mobile units to provide dental care for patients in the remote provinces.

Professor See Sirisinha, dean of the School of Dentistry, University of Medical Science, Bangkok, has been invited to serve a five-year term as a member of the WHO Expert Advisory Panel on Dental Health. Membership to the panel is an honor. Panel members are asked to give the organization the benefit of their knowledge and to inform it of important developments in their fields, particularly in the countries they represent.

C. Ratanaphaisal

News of Dentistry

ANNUAL SESSION EVENTS

Conferences and meetings of groups in the dental field preceded the annual session of the American Dental Association held in Miami, Fla., November 4-7. Many of the 30-odd associated groups which met prior to the annual session elected officers. Among the conferences was the State Society Officers' Conference.

STATE OFFICERS' CONFERENCE

The strength of dentistry rests with the state societies and the component organizations, Harry Lyons, president of the American Dental Association, told the 38th Conference of State Society Officers, November 3, in the Eden Roc Hotel. The conference is composed of officials of the Association's 54 state and territorial societies.

A panel discussion on malpractice as an occupational hazard was a feature of the meeting. Other speakers included Carl V. E. Cassel, secretary, Minnesota State Dental Association; Perry J. Sandell, Chicago, director of the Association's Bureau of Dental Health Education, and John G. Rooks, executive secretary, California State Dental Association.

Robert C. Frates, of San Francisco, conference president, presided; Bryant S. Carroll, president of the Florida State Dental Society, welcomed visitors.

Dr. Cassel described the problems involved in the construction of the new $86,000 headquarters of the Minnesota State Dental Association in St. Paul. Of $51,000 subscribed since the subscription campaign began in 1955, $49,000 had been paid, he said. Contributions ranged from $5 to $1,400, the average being $38. Special contributions came from component societies, the dental trade, the North Dakota State Dental Association and others. The new headquarters is shared with the State Board of Dental Examiners as tenant.

The dentist should teach his patients the relation of dental health to over-all well-being, Mr. Sandell declared. The Association makes available to dentists many different types of material to aid in the education of dental patients, but less than 25 per cent of the members of the Association have used this material, he said.

"Dental societies should discuss dental health education and should provide good space at their meetings for displays," said Mr. Sandell. "They should cooperate with parent and teacher groups and should utilize educational television. Our Bureau is happy to work with state societies in developing public and patient education programs."

The panel discussion on malpractice was conducted by the Southern California State Dental Association, with Melvin E. Ralston as moderator. Participants were Carlton H. Williams, J. C. A. Harding, J. Lorenz Jones, Bruce R. Kurtz, John B. Wilson, and James Robinson, executive secretary.

In California a 60 per cent increase in professional claims against dentists had occurred in recent years, Dr. Ralston said. From 1953 to 1955 some 589 claims had been filed.

Dr. Harding, reading a paper prepared by Arthur L. Hudson, of Glendale, said that failure to take roentgenograms was a hazard. Roentgenograms are part of the clinical record of the patient and should be retained by the dentist for a minimum of at least five years, said Dr. Harding.

Dr. Jones suggested that the dentist have the patient fill out a health questionnaire.

Dr. Kurtz, chairman of the counseling committee of the Los Angeles County Dental Society, said his committee had adjudicated more than 800 complaints of patients, of which only eight had been taken eventually to court. The committee does not accept complaints already in litigation, he said. The committee has 16 members. Each case requires a minimum of five man-hours. Complaints must be in writing, and all records are confidential. Dentures, especially immediate dentures, constitute the biggest problems for the committee.

Mr. Rooks, speaking on "Legal Problems of Constituent Dental Societies," said it was a dangerous practice for a dental society to operate an active program without the benefit of competent legal counsel. Retaining legal counsel only for individual projects was but a substitute for a proper plan, said Mr. Rooks, adding: "An attorney on an annual retainer basis who serves a particular body over a period of years is somewhat like the family dentist or family physician. . . . The attorney learns the activities, programs, problems, etiology and philosophy of the group and, as a result, is in a much better position to render an ideal service than is one . . . who has been consulted only on infrequent occasions."

Harold E. Tingley, of the Massachusetts Dental Society, was elected president of the Conference to succeed Dr. Frates.

Dr. Cassell was chosen president-elect and Thomas D. Holder, Portland, Ore., is the new secretary-treasurer of the organization.

William R. Alstadt, president-elect of the American Dental Association, addressed the luncheon meeting. Dr. Alstadt discussed the responsibilities and duties of officers, trustees, association executives and editors of dental organizations.

ASSOCIATED GROUPS

American College of Dentists at its 38th annual convocation ceremonies November 3 in the Eden Roc Hotel installed Thomas J. Hill, of Brecksville, Ohio, chairman of the Council on Dental Research of the Association, as president. Dr. Hill succeeds Gerald D. Timmons, of Philadelphia, dean of Temple University School of Dentistry.

Other officers elected are: president-elect, Harold J. Noyes, Portland, dean of the University of Oregon Dental School; vice-president, Samuel R. Parks, Dallas; treasurer (re-elected), William N. Hodgkin, Warrenton, Va., and new members of the Board of Regents: Philip E. Blackerby, Jr., Battle Creek, Mich., and Crawford A. McMurray, Ennis, Tex.

Honorary degrees were conferred on Irl C. Schoonover, Washington, D. C., chief of the division of mineral products, National Bureau of Standards, and Millard E. Gladfelter, Philadelphia, vice president and provost of Temple University.

The degree of Fellow was conferred on 135 dentists from the United States, Canada, Cuba and England.

American Association of Dental Examiners on November 2 installed Arthur W. Kellner, Hollywood, Fla., as president, to succeed Walter A. Wilson, Trenton, N. J. Other officers chosen are: president-elect, Richard F. Gilmore, Grand Junction, Colo.; vice-president, north, Milton G. Walls, St. Paul, Minn.; vice-president, east, Clarence G. Brooks, New London, Conn.; vice-president, south, H. Arthur Zappe, Mineral Wells, Tex. The secretary-treasurer is Carl A. Bumstead, Lincoln, Neb.

American Society of Oral Surgeons at its November 3 meeting in the Golden Gate Hotel installed W. Talbot Foster, San Antonio, Texas, as president, to succeed G. Thaddeus Gregory, Indianapolis. Other officers are Frederick Pfeiffer, of New York, president-elect, and Frank B. Hower, Louisville, Ky., secretary. A. B. Coxwell, Jr., Louisville, Ky., continues as executive secretary.

American Society of Dentistry for Children at its November 4 meeting in the Balmoral Hotel installed Albert L. Anderson, San Diego, as president to succeed Lawrence R. Burdge, Red Bank, N. J. Other officers elected are: president-elect, Harold K. Addelston, New York; vice-president, William E. Brown, Ann Arbor, Mich., and secretary-treasurer, Ralph E. McDonald, Indianapolis.

American Academy of the History of Dentistry installed C. Willard Camalier, Washington, D. C., as president at its meeting November 1 in the Eden Roc Hotel. Dr. Camalier who is a past president, and currently an assistant secretary, of the American Dental Association, succeeds Samuel R. Parks, Dallas, Tex. Other officers chosen are: president-elect, Robert Thoburn, Daytona Beach, Fla.; vice-president, Harold Faggart, Philadelphia; secretary-treasurer, Milton B. Asbell, Camden, N. J., and editor, George B. Denton, Chicago.

American Academy of Oral Roentgenology at its November 1 meeting in the Lucerne Hotel elected Rene Rochon, Detroit, dean of the School of Dentistry, University of Detroit, as president to succeed Arthur H. Wuehrmann, Birmingham, Ala. Gordon M. Fitzgerald, San Francisco, was chosen president-elect. Other elected officers are: vice-president, Harrison M. Berry, Jr., Philadelphia, and secretary-treasurer, Theodore S. Grant, San Francisco.

Donald T. Waggener, Lincoln, Neb., is the new councilor for the western district, and Claude D. Richardson, Jr., Richmond, Va., for the eastern district.

American Academy of Pedodontics at its November 1 meeting in the Delano Hotel elected as its president Harold Addleston, of New York City, to succeed Samuel D. Harris, Detroit. Maury Massler, Chicago, was re-elected vice-president, William E. Cody, Denver, was re-elected secretary, and Joseph T. Hartsook, Ann Arbor, Mich., was re-elected treasurer.

Newly elected to the board of directors were Albert L. Anderson, San Diego, Calif., and Ralph E. McDonald, Indianapolis.

American Academy of Implant Dentures, at its November 1 to 3 meeting in Miami, elected Col. Roy L. Bodine, Jr., Ft. Sam Houston, Texas, as its president. Other officers are Earl W. Pernell, Chandler, Ariz., president-elect; Frank A. Strake, St. Louis, vice-president; A. Norman Cranin, Brooklyn, secretary; Marshall W. Mueller, St. Paul, treasurer, and Robert H. Meibauer, New York, chairman of the admissions board.

National Association of Seventh Day Adventist Dentists at its meeting November 3 in the Algiers Hotel elected John Bata, Jr., of Hyattsville, Md., as president to succeed J. Glenn Linebarger, Jacksonville, Fla.

Other officers elected are: president-elect, Walter Dorn, Silver Spring, Md.; vice-president, Franklyn C. Nelson, Pomona, Calif.; secretary-treasurer, Glenn Curtis, Loma Linda, Calif., and editor, Eldon E. Carman, Marietta, Ga.

Gerald Mitchell, of Redlands, Calif., was elected historian, and Joseph Leech, of Atlanta, Ga., was elected to the board of directors.

American Dental Society of Anesthesiology installed Leonard Monheim, Elizabeth, Pa., as president at its meeting November 3 in the Sorrento Hotel. He succeeds Cloyd C. Shultz, Lebanon, Pa. Dr. Monheim also was presented the Heidbrink award.

Morgan Allison, Columbus, Ohio, was elected first vice-president. Harry Sultz, Buffalo, N. Y., was chosen secretary and Joseph Osterloh, San Francisco, was elected treasurer.

International College of Dentists inducted 60 new members into its American section at the November 3 meeting in the Empress Hotel.

Frank Martin, of Toronto, Ontario, was elected president of the college at large, succeeding Paul Aufderheide, Cleveland. Others elected to office in the international group are: president-elect, Herbert W. Mason, Indianapolis; vice-president, R. Gordon Agnew, San Francisco; treasurer, Fred A. Richmond, Kansas City, Kan.; secretary-general, H. O. Westerdahl, Minneapolis, and members of the executive council, Frank F. Lamons, Atlanta, Ga., and Ralph E. Creig, Cleveland.

Newly-elected president of the United States section is James J. Vaughn, Nashville, succeeding Dr. Lamons. President-elect is Bruce R. Kurtz, Pasadena, Calif. Other officers are: vice-president, Reuben E. Miller, Easton, Pa.; treasurer, Roy F. West, Seattle; registrar, H. O. Westerdahl, Minneapolis; regents: Thomas P. Fox, Philadelphia; Stanley C. Baker, Greenwood, S. C.; Leo M. Shanley, St. Louis, and Edward A. Bourassa, Seattle. Vice-regents are: Wayde D. Kelly, Harrisburg, Pa.; Arvin W. Mann, Ft. Lauderdale, Fla.; E. J. Justis, Memphis, Tenn., Merrill G. Swenson, Portland, Ore., and William R. Alstadt, Little Rock, Ark.

American Association of Public Health Dentists installed as its new president Roy D. Smiley, of Indianapolis, at its November 2 meeting in the Columbus Hotel. Dr. Smiley succeeds Thomas L. Hagan, Washington, D. C.

Other officers are: president-elect, Chester V. Tossy, Lansing, Mich., and secretary-treasurer, Polly Ayers, Birmingham, Ala. Other officers are William P. Kroschel, Atlanta, Ga., and Floyd H. De Camp, Jacksonville, Fla.

American Association of Dental Editors installed **Wesley J. Dunn**, of Toronto, Ontario, as president at the annual conference on dental journalism, November 3, in the Eden Roc Hotel. This was the first time that a citizen of a country other than the United States had held the post of president in the association. Dr. Dunn, editor of the *Journal of the Canadian Dental Association*, succeeds L. Franklin Bumgardner, Charlotte, N. C.

Harry Wilson, Des Moines, Iowa, is the new president-elect. Other officers are: vice-president, Floyd Ostrander, Ann Arbor, Mich.; secretary-treasurer, Austin H. Kutscher, Highland Park, N. J., and editor, Ralph Rosen, University City, Mo.

The association bestowed its distinguished service award on John E. Gurley, of San Francisco, one of the founders of the A.A.D.E. Dr. Gurley edited the *Bulletin of the California State Dental Association* from 1916 to 1940; edited the *Journal of the American College of Dentists* from 1934 to 1954; the *Journal of Dental Education* from 1948 to 1953, and the *Frater* of Psi Omega from 1932 to 1942.

American Denture Society installed Frederick N. Harris, of Pasadena, Calif., as president at its November 3 meeting in the Americana Hotel. Dr. Harris succeeds Arthur L. Roberts, Plainview, N. Y. Other officers are: president-elect Carl T. Ostrem, Des Moines, Iowa; vice-president, Lindsey D. Pankey, Coral Gables, Fla., and secretary-treasurer, Victor L. Steffel, Columbus, Ohio.

Association of American Women Dentists installed Nancy Holmes, of Dallas, Texas, as president at its annual meeting November 4 in the di Lido Hotel. Dr. Holmes succeeds Mary E. Simmons, Peoria, Ill.

Natalie McDonald, Englewood, N. J., was chosen president-elect and Marguerite McCann, San Antonio, Texas, was elected secretary-treasurer.

Newly elected executive board chairmen are: Eleanor DeRoche, Arlington, Mass.; Nann A. Wickwire, Tampa, Fla.; Ruth Mountain, Olean, N. Y.; Betty J. Koss, Indianapolis; Elizabeth Downie, Detroit; Lorraine Thompson, Denver, and Maude Spence, Los Angeles.

American Academy of Periodontology installed Donald A. Kerr, Ann Arbor, Mich., as president at its meeting November 2 in the di Lido Hotel. Dr. Kerr succeeds Stanley C. Baker, Greenwood, S. C.

Col. Joseph L. Bernier, of the Armed Forces Institute of Pathology, Washington, D. C., was chosen president-elect.

Clarke E. Chamberlain, Peoria, Ill., was elected secretary.

Members elected to the executive council are Evert A. Archer, Chicago, and Richard Chace, Orlando, Fla.

Named to the American Board of Periodontology were Dr. Chamberlain and Raymond E. Johnson, St. Paul.

American Dental Interfraternity Council, at its November 5 meeting in the Saxony Hotel, elected Abram Cohen, Philadelphia, a member of Alpha Omega, as president to succeed William S. Harman, Cove, W. Va., who is a member of Psi Omega.

Myron A. Roberts, Buffalo, (Delta Sigma Delta) was elected vice-president and J. C. A. Harding, San Diego, Calif., (Xi Psi Phi) was elected secretary-treasurer.

American Dental Hygienists' Association installed Miss Elizabeth Linn, Thiensville, Wis., as president at its November 7 meeting at the Ivanhoe Hotel. Miss Linn succeeds Mrs. March Fong, Oakland, Calif. Mrs. Helen Garvey, Detroit, was chosen president-elect. Other officers are Miss Tillie Ginsburg, Milwaukee, first vice-president; Miss Edna Bradbury, Cambridge, Mass., second vice-president, and Miss Ann Ragsdale, Atlanta, Ga., third vice-president. Miss Ruth Heck, Philadelphia, is treasurer of the association and Miss Margaret E. Swanson, Washington, D. C., is executive secretary.

American Dental Assistants Association, which met November 4-7 at the Ivanhoe Hotel, installed Mrs. Magdalene Kulstad, La Habra, Calif., as president. Mrs. Kulstad succeeds Mrs. Mary Frances Dutton, Macon, Ga.

Mrs. Elma Troutman, San Francisco, was chosen president-elect. Also elected were Mrs. Virginia Hoffman, Pittsburgh, first vice-president; Miss Lois Kryger, Seattle, second vice-president, and Miss Corinne Dubuc, Pawtucket, R. I., third vice-president. Mrs. Harriett Darling, Huron, S. D., is treasurer, and Mrs. Joy Phillips, Phoenix, Ariz., is general secretary.

An award was presented to Miss Mira Lindeman for an essay "It Can Be Done" printed in the *Dental Assistant*.

Delta Sigma Delta installed J. Donald Shriber, Los Angeles, as Supreme Grand Master. He succeeds Harold Van Natta of Cleveland. Kenneth C. Pruden, Paterson, N. J., was chosen Supreme Worthy Master, and S. G. Applegate, Detroit, Supreme Scribe.

Members of the Council on Scientific Session who planned the most comprehensive scientific program in Association history include: (seated, l. to r.) Charles S. Kurz, chairman, and David J. Fitzgibbon; (standing, l. to r.) Walter J. Monie; Peter C. Goulding, secretary, and Donald R. Mackay. Jarvis M. Williams, another Council member, was called home because of illness.

GENERAL MEETING AND OTHER EVENTS

An overflow audience attended the General Meeting Tuesday evening, November 5, in the grand ballroom of the Fontainebleau Hotel.

President Harry Lyons, in an address entitled "The Crystal Ball," said that although dentistry in the United States enjoyed the admiration and esteem of the world, ominous clouds were gathering on the horizon. The dental profession had accepted the basic responsibility of providing ways and means ultimately for the entire population to receive the benefits of dental care, but currently only about 45 per cent of the people were applying for and receiving dental care in a calendar year, he said.

"It is our responsibility to provide the facilities and personnel necessary to meet the increasing demand," said the speaker. "More than this, dental care should be provided for all people within the limits of their ability to pay. For those unfortunates unable to pay for dental care our profession has at least the responsibility to provide plans by which the worthy and the needy may receive the benefits of dental care. . . . If we abdicate our responsibility and permit others to develop plans by which all segments of our population may ultimately receive dental care we may find the plans unacceptable to us.

"I would agree that we alone are not to blame that 55 per cent of our population does not apply for or receive dental care on an annual basis," said President Lyons.

Proposals for nationalized health services had developed because health care, including dental care, had not been made available to all persons, the speaker asserted.

"Programs which some may label as 'socialistic' will not be prevented by loud talk in the halls of Congress or elsewhere," he continued. "They will be avoided only by our health service professions meeting their responsibilities both in letter and spirit, by providing better plans than those proposed by others."

The direct relationship of patient and health service was "part of the fabric of our democratic civilization," he said.

Dentistry had the responsibility to prepare professional and auxiliary personnel in numbers sufficient to meet the ever-increasing demand for dental care, said the president of the Association. He said the dental schools were losing ground fast in the matter of the dentist-population ratio.

"Water fluoridation is our first great contribution toward the prevention of dental disease," he said. "There must be many others. Such research findings, improved practice management and newer technics offer possibilities of meeting, in part, the challenge related to the increasing demand for dental care."

Support for the newly founded Fund for Dental Education, Inc., sponsored by the American Association of Dental Schools, was urged.

Dental schools should have many additional millions for larger faculties and additional research programs, he said, adding that "research can completely change dental practice as we know it today."

Dr. Lyons' address was followed by a concert presented by the "Strolling Strings" of the U.S. Air Force Symphony Orchestra, and a water ballet in the pool of the Fontainebleau.

Arthur W. Kellner, of Hollywood, Fla., chairman of the General Committee on Local Arrangements, welcomed members and guests.

SCIENTIFIC SESSION

Essays, clinics, forums, table clinics and motion pictures were presented daily throughout the meeting at the Dinner Key Auditorium. On November 5 a color television program that originated in the Dade County Dental Research Clinic was shown on large screens. Attendance at the scientific session totaled 11,090, of whom 5,414 were registered members of the American Dental Association.

The Council on Scientific Session presented awards to the following for outstanding exhibits:

Robert A. Atterbury, Oak Park, Ill., and Sunder J. Vazarini, Chicago, benign and malignant tumors of the oral cavity; William H. Olin, Iowa City, Iowa, cleft palate rehabilitation; U. S. Navy Dental Service, contributions to dental science by the U. S. Navy Dental Corps; Division of Dental Medicine, Colgate Palmolive Company in cooperation with Rutgers State University of New Jersey, analytical record of toothbrushing habits; Georgetown University School of Dentistry, undergraduate orthodontics, and Indiana University, Joseph C. Muhler, Bloomington, recent developments in the clinical use of stannous fluoride.

Shown on the facing page are some pictorial records of the American Dental Association's 98th annual session in Miami. (Top row) Miss Georgia Krause, supervisor of the Membership Department, aided in the process of registration. Despite their busy schedules, Bernard J. Conway (r.), secretary of the Council on Legislation, and Rep. John E. Fogarty (D., R.I.), a member of the Committee on Appropriations of the U. S. House of Representatives, found time to engage in pleasant conversation. (Second row) While their husbands attended the scientific sessions, the ladies attended various social functions especially arranged for them. (Third row) Each annual session produces a new member of this exclusive "club"—the past presidents of the American Dental Association. (Seated, l. to r.) J. Ben Robinson, Marcus L. Ward, C. Willard Camalier, Oren A. Oliver and C. Raymond Wells. (Standing, l. to r.) LeRoy M. Ennis; Leslie M. FitzGerald; Daniel F. Lynch; Harry Lyons, newest addition; Otto W. Brandhorst; Clyde E. Minges, Bernerd C. Kingsbury and H. B. Washburn. (Bottom row) Among those who participated in the State Society Officers Conference were (l. to r.) Carl V. E. Cassel, secretary of the Minnesota State Dental Association, vice-president of the Conference; Robert C. Frates, treasurer of the California State Dental Association, immediate past president, and Harold E. Tingley, secretary of the Massachusetts Dental Society, president. The interests of the Armed Forces were represented by (l. to r.) Thomas P. Fox, brigadier general in the U. S. Army Reserve; Rear Admiral Ralph W. Malone, chief of the dental division, office of the Surgeon General, Navy; Maj. Gen. James M. Epperly, chief of the dental division, Office of the Surgeon General, Army; Frank B. Berry, Assistant Secretary of Defense (health and medical); Francis J. Reichmann, then chairman of the Association's Council on Federal Dental Services, and Maj. Gen. Marvin E. Kennebeck, assistant for dental services, Office of the Surgeon General, Air Force.

COUNCIL MEMBERS

Council members elected to serve for three years on the 17 Councils of the Association were:

Constitution and Bylaws
James E. Berney, Iowa
Herbert L. Taub, New York

Dental Education
Maynard K. Hine, Indiana
R. E. V. Miller, Pennsylvania
C. H. Schuyler, New York

Dental Health
Byron W. Bailey, New Hampshire
Glenn R. Brooks, Michigan
Jay H. Eshleman, Pennsylvania

Dental Research
Herbert D. Coy, Virginia
Thomas J. Hill, Ohio

Dental Therapeutics
L. W. Burket, Pennsylvania
W. B. Ingersoll, District of Columbia
E. F. Mimmack, New York

Dental Trade and Laboratory Relations
H. L. Bunker, Kansas
R. Fred Hunt, North Carolina

Federal Dental Services
W. H. Christensen, Washington
D. L. Matteson, Oklahoma

Hospital Dental Service
M. L. Allison, Ohio
P. J. Sheridan, Connecticut

Insurance
J. W. Douglass, South Carolina
L. R. Ludwigsen, California

International Relations
Obed H. Moen, Wisconsin
Fred A. Peterson, Colorado
Carl L. Sebelius, Tennessee

Journalism
L. G. Berkey, New York
M. J. Wilson, Kentucky

Judicial
M. A. Heckler, New York
C. E. Rutledge, California

Legislation
Matthew Besdine, New York
Floyd W. Pillars, Iowa

Membership
J. A. Farrell, Illinois
J. Murray Gavel, Massachusetts

National Board of Dental Examiners
Harry Blechman, New York
D. Roy Grant, California
John W. Green, Illinois

Relief
Paul H. Bowden, Montana
W. O. Vopata, Illinois

Scientific Session
J. Malcolm Elson, Illinois
D. J. Fitzgibbon, District of Columbia

PUBLIC HEALTH

The Reference Committee on Public Health was headed by H. J. Hoppe, Ohio.

The committee proposed, and the House adopted, a definition of dental health care which deleted the word "health," the amended definition reading as follows: "Dental care is the sum total of the diagnostic, preventive, remedial and restorative services rendered dental patients by practitioners legally authorized to perform such services."

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A CONGRESSMAN VIEWS DENTAL HEALTH

Representative John E. Fogarty addressed the House of Delegates the afternoon of November 6. He thanked the American Dental Association for honoring him with honorary membership.

"The democratic processes of the American Dental Association are so similar to those of the House of Representatives," he said. "Every member of your organization has had a chance to be heard in a democratic way. That is what has made your organization great, as it has made our country great."

"In the spectrum of specialties and disciplines and categories making up the health profession, I have observed in recent years that those who together constitute the dental profession have been accorded ever-increasing stature," said Representative Fogarty. "I am convinced that this Association has been the dominating influence. It has dedicated its efforts to the improvement of dental services to the people. . . ."

Whereas there were separate private agencies devoted to control and research in connection with tuberculosis, cancer, heart disease and other illnesses, other than the American Dental Association there is no private organization dedicated to the expansion of dental public health and research programs and public education, the speaker said, adding:

"It follows then that the attainment of understanding by the public of dental health falls heavily upon members of the profession themselves. . . . The degree to which you as dentists, individually and through organized effort, develop understanding of oral health problems will determine the extent of public appreciation and support for your professional objectives.

"The dental profession has during the past ten years particularly become an extrovert in the national health forums. Your message is being heard, and there is a growing public appreciation for the efforts of dental researchers and educators and for the professional services that dentists render. . . .

"The increasing emphasis on research has brought with it an excellent spirit of cooperation between the American Dental Association and the Public Health Service. . . . The American Dental Association has expanded much of its resources in developing methods for expanding dentistry's capacity for serving more people. The Public Health Service, on the other hand, contributes to the fulfillment of the same objective through its demonstration program and through application of preventive programs in the field of dental public health."

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"In this connection, I may say with some pride that 77 per cent of the people of Rhode Island are provided with fluoridated water," he said. "I understand that this is nearly twice the national average, which clearly indicates that much more needs to be done in promoting the application of this important preventive procedure."

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"Last year, approximately 275 projects were supported in the amount of $2,700,000. It was the energetic support of your membership and your local and state societies under the leadership of the American Dental Association that convinced Congress of the urgent need for these research programs.

"Last year, the National Institute of Dental Research presented before my Congressional committee clear evidence

COUNCIL MEMBERS

Council members elected to serve for three years on the 17 Councils of the Association were:

Constitution and Bylaws
James E. Berney, Iowa
Herbert L. Taub, New York

Dental Education
Maynard K. Hine, Indiana
R. E. V. Miller, Pennsylvania
C. H. Schuyler, New York

Dental Health
Byron W. Bailey, New Hampshire
Glenn R. Brooks, Michigan
Jay H. Eshleman, Pennsylvania

Dental Research
Herbert D. Coy, Virginia
Thomas J. Hill, Ohio

Dental Therapeutics
L. W. Burket, Pennsylvania
W. B. Ingersoll, District of Columbia
E. F. Mimmack, New York

Dental Trade and Laboratory Relations
H. L. Bunker, Kansas
R. Fred Hunt, North Carolina

Federal Dental Services
W. H. Christensen, Washington
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of the need for training more individuals for academic teaching and research careers as related to the various fields of dental science. As a result, and again with your Association's support, a new program of training grants and awards was established, and 14 dental schools started research training programs, with 57 trainees involved at a total expenditure of $500,000 in its first year.

"Dental schools have shared, too, in the assistance available from a new program established last year and known as the Health Research Facilities Act. Under this program, seven grants in the amount of $921,000 were made to dental schools to aid in the construction of research facilities; in addition, a few grants have been approved for combined medical and dental research facilities. This $90 million, three-year program is available for construction of all types of nonfederal health research facilities.

"In the last session of Congress I introduced a broader bill under which $300 million would be available over a five-year period, for either teaching or research construction; of this, $40 million would be earmarked for dental schools. I believe legislation of this kind is badly needed, and I intend to pursue this bill vigorously when Congress reconvenes.

"There is a recognized need for a center of dental research to do the type of research which requires specialized equipment beyond the resources of the dental schools and to supplement the schools' programs by training scientists in the use of new and advanced equipment and technics.

"The American Dental Association has long been aware, and has helped Congress be aware, of the Dental Institute's acute shortage of research space in Bethesda. We hope this can be relieved by a new dental research building there. The Congress has appropriated money for the plans for this structure, and I understand these plans are now well advanced."

Representative Fogarty was given a standing ovation by the House of Delegates at the conclusion of his address.

BERRY DISCUSSES MEDICARE AMENDMENT

Among guests to address the House was Frank M. Berry, assistant secretary of defense for health and medical affairs.

Dentists are now included for direct remuneration in the health care program for dependents of military personnel, said Dr. Berry. A new order issued by the Department of Defense provides that dentists with hospital appointments can receive payment directly for services to dependents in hospitals. Previously, dental care could be paid only if a physician authorized the services.

The amendment was achieved largely through the efforts of the Association's Council on Federal Dental Services in cooperation with the Defense Department's dental advisory groups, said Dr. Berry.

The amendment also provides that dentists are to be paid directly for "treatment of fractures, dislocations, lacerations and other wounds that are legitimately cared for by dentists, including related diagnostic and therapeutic tests and procedures authorized by the attending dentist [when a patient is not hospitalized]."

No draft calls for dentists were anticipated this year or next, the Department of Defense spokesman said. For the fiscal year 1959, beginning next July, more than 2,300 senior dental students would be liable for military service, of whom only 37 per cent were needed for active duty, said Dr. Berry.

INTERNATIONAL GUESTS

Three hundred and ninety-nine international guests, including more than three hundred dentists—the largest number by

far ever to attend an annual session of the Association—were welcomed in Miami Beach. Among the guests to address the House were Dr. Gerald Leatherman, secretary-general of the Fédération Dentaire Internationale; Don W. Gullet, secretary of the Canadian Dental Association; Gustavo Berger, of the Facultad de Odontologia Universidad de San Carlos de Guatemala; Adolfo Fastlicht, official representative of the Asociacion Dental Mexicana; Hector Franco Santoni, of the Dominican Republic, and Guillermo Kepfer, of Guatemala.

Dr. Berger presented a diploma of honor to the American Dental Association.

Dr. Leatherman brought greetings from the F.D.I., the British Dental Association, the American Dental Society of Europe, the American Dental Society of London, and the British Society of Periodontology.

"I would like to tell this House of Delegates how much the American Dental Association, by giving its support to the F.D.I. during the last ten years, has influenced the progress of dentistry as a world health service," said Dr. Leatherman. "I would ask you to continue with ever-increasing vigor this support. The obligations of the dental profession to give a health service to the peoples of the world are scarcely realized."

American dental societies outside the United States confronted a problem because their source of new members with United States and Canadian degrees was drying up, said Dr. Leatherman. He asked dental educational authorities in the United States not to close their doors to applicants from abroad. "It is still as necessary as ever before for the teaching and principles of the American system of dentistry to be spread all over the world.

"If the peoples of this world are to survive, they must get to know each other better and learn to understand the national characteristics and be tolerant with each other's prejudices. It is ignorance and fear of one another which create mistrust.

"Travel, ladies and gentlemen. Come to our meetings abroad. Read our literature and give us the privilege of your friendship."

Among the international guests were representatives of 29 countries.

Association Affairs

CHAIRMEN AND SECRETARIES OF COUNCILS MEET JOINTLY

Chairmen and secretaries of 15 of the 17 councils of the American Dental Association held their second conference December 16-17 in the Central Office.

The conference heard and discussed reports from the following: Harold Hillenbrand, Association secretary; William R. Alstadt, Association president; Reginald H. Sullens, associate secretary, Council on Dental Education; Jay H. Eshleman, chairman, Council on Dental Health; Peter C. Goulding, secretary, Council on Scientific Session; John E. Rush, assistant business manager of the Association; Herbert B. Bain, director of the Association's Bureau of Public Information, and Walter E. Dundon, chairman, Council on Dental Trade and Laboratory Relations.

Programs of the Association councils must be within the object of the Association, must be consistent with the Association's tax-exempt status and with state and federal statutes, must conform to the highest ethical and scientific standards, and must be consistent with the voluntary character of the Association, said

Dr. Hillenbrand in his opening remarks.

The Association bylaws, he said, provide the basic guidance for each council; they outline the channels of administration, indicate the flow of authority and set forth the scope of the council's program. He urged council members to study the *Constitution and Bylaws,* the *Manual of the House of Delegates,* the *Rules of the Board of Trustees* and the *Standing Rules for Councils,* adding: "If all councils work under the same ground rules the Association will achieve that unity and coherence of program which are productive of the best results."

A council meeting is the culmination of council program development and requires planning well in advance, Mr. Sullens said. The annual report of a council serves two major purposes, said Mr. Sullens: "It is the official document for reporting and explaining to the membership the progress that is made on council programs, and, second, it is the method best used by a council to submit policy recommendations for official action by the House of Delegates."

Dr. Eshleman, discussing what the council chairman expects from the council secretary, said: "In the chairman-secretary relationship, the secretary is responsible to the chairman who holds the ultimate responsibility for the council program, policy recommendations, reports and budget. The council secretary is in a position to recognize, study and compile information concerning major problems within the council's activity. He should also prepare some possible solutions, in digest form, for the council's consideration. . . . His responsibility is to guide the activity of the council in areas requiring attention, discussion and decision by council members."

Mr. Goulding discussed what the council secretary expects from the council chairman. The good chairman, he said, does not delegate his responsibilities to the secretary; he recognizes and carries out those responsibilities which are his exclusively, and he is assiduous in fulfilling his part of those responsibilities he shares with the secretary. Representation of the Council's programs before the Board of Trustees, the House of Delegates and its reference committees is specifically the chairman's concern, said Mr. Goulding.

Mr. Rush presented a broad picture of budget and finance as they pertain to the councils of the Association. Mr. Bain, discussing public relations for councils, said the recommendations of its councils were the nucleus from which the great bulk of the Association's public relations were formed. He urged council members to consider public relations, both within and without the profession, in their deliberations, and to avail themselves of all means of communication to enlist the understanding and support of the council's program by every other agency and every member of the Association.

President Alstadt outlined the duties and responsibilities of the officers, trustees, House of Delegates and councils, and traced the flow of authority from the House to the Board of Trustees and councils. He said there were good reasons for increasing the membership of those councils with five members to seven members. President Alstadt listed the six major objectives he would pursue during his term of office: to obtain funds for a new dental research building; to work for passage of the Jenkins-Keogh bill; to raise the Dental Corps in the Army and the Air Force to the same standing as that held by the Navy Dental Corps; to expand the activity of the Council on International Relations; to seek more and better dental care for persons in penal institutions, mental hospitals and nursing homes, and to urge dental examinations for those obtaining life insurance. These activities would require more money and higher dues, and the cooperation of the entire membership.

The councils are the policy-recommending agencies of the Association, Dr.

Hillenbrand told the closing session of the conference. He suggested that councils might consider the following points:

1. Review the current status of the council's program.
2. Give priorities within the short-term and long-term programs.
3. Analyze the council's current budget and project its budget needs.
4. Relate the current and long-term programs to the staff and its resources.
5. Assign areas of responsibility and adopt a timetable.
6. Develop methods for drawing up reports and distributing them.
7. Select two or three recommendations to be made each year.
8. Decide whether the council is going to "take sides."
9. Be prepared to justify the council's recommendations.
10. Decide what to do with the recommendations if they are approved.

HILLENBRAND, SCHOUR AMONG CHICAGO'S TOP CITIZENS

Two of the names on the roster of "Chicago's 100 outstanding citizens" belong to members of the dental profession. Harold Hillenbrand, secretary of the American Dental Association, and Isaac Schour, dean of the College of Dentistry of the University of Illinois, are among the 100 leaders, selected from more than 9,000 nominees, honored for their contribution to the advancement of Chicago's welfare.

Selection of the 100 outstanding citizens was a feature of the four-month observance of the 100th anniversary of the establishment of the Jesuit order in Chicago. Those selected were honored at a banquet on December 12 at the Palmer House. Among those honored were leaders distinguished nationally and internationally in the fields of atomic science, education, government, publishing, welfare, medicine, dentistry, industry, law and business.

A.D.A. OPPOSES FAMILY CLINICS AT MILITARY BASES

A special meeting of the Dental Advisory Committee to the Department of Defense was called by Thomas P. Fox, chairman, on December 15 to consider the following resolution, adopted by the Association's House of Delegates at its 1957 annual session. This resolution reflects the Association's unreserved opposition to the type of "family dental clinic" recently established at some Air Force bases.

Resolved, that the Board of Trustees be directed (1) to take immediately the necessary steps through existing agencies, councils and bureaus of the Association to secure, through regulation of the Defense Department or through enactment of laws by Congress, such regulations or laws that will restrict the establishment or continuation of clinics or facilities for the provision of dental care for the dependents of military personnel on military bases, unless provisions for such dental care meet the requirements of the Dependents' Medical Care Act, Public Law 569, 84th Congress; and (2) that the Board of Trustees report to the House of Delegates in 1958.

The seven man committee, which numbers among its members E. J. Justis, chairman of the Association's Council on Federal Dental Services, and Percy T. Phillips, president-elect of the American Dental Association, invited representatives of the Air Force and of the Association to present their respective views. Dr. Justis cited the four basic objections of the dental profession to the establishment of "family dental clinics" at military bases:

. . . first, because such clinics do not and cannot provide to dependents a uniform standard of dental care, which is the criterion established by the Congress of the United States for any program purporting to fulfill the health needs of the said dependents; second, these clinics represent an effort to change the traditional concepts and standards controlling the provision of a professional level of dental health services to society; third, they may actually constitute a threat to the professional standing of such dental personnel as may be

employed in them; and fourth, they are housed, equipped, operated and administered in such a manner as to strongly impair their legality when viewed against the language of Public Law 569, and if permitted to continue in operation, could ultimately be responsible for the collapse of all efforts to establish a uniform and professionally acceptable dental program within the Medicare program . . .

In conclusion to the argument, Dr. Justis stated that the American Dental Association regarded as unfortunate the fact that the Department of Defense Dental Advisory Committee was not consulted before the "family dental clinics" were established. The Association requested that the Committee produce a resolution calling for the immediate disestablishment of all such clinics.

The recommendation of the Committee was forwarded to Frank B. Berry, Assistant Secretary of Defense (health and medical).

Rudolph Friedrich, secretary of the Council on Dental Health, Willard C. Camalier, assistant secretary of the Association, and Herbert C. Lassiter, secretary of the Council on Federal Dental Services, represented the Association.

Other members of the Dental Advisory Committee are Maj. Gen. James M. Epperly, chief of the dental division, office of the Surgeon General, Army; Maj. Gen. Marvin E. Kennebeck, assistant for dental services, office of the Surgeon General, Air Force; Rear Admiral Ralph W. Malone, chief of the dental division, office of the Surgeon General, Navy, and John C. Brauer, dean of the University of North Carolina Dental School.

EDUCATION AND LICENSURE CONGRESS MEETS IN FEBRUARY

"Unique Programs in Dental Education" will be the topic of the Fourteenth Congress on Dental Education and Licensure which will be held on February 1 at the Conrad Hilton Hotel, Chicago.

Divided into two sessions, the morning program will be moderated by Harold W. Oppice, chairman of the Association's Council on Dental Education, the Council which is sponsoring the Congress. Willard C. Fleming, dean of the School of Dentistry of the University of California, will moderate the afternoon program.

Participants will include Wendell L.

Harold Hillenbrand, Association secretary, Dr. Isamu Tashiro, Chicago, Professor Setsuzo Okino, managing director of the Japan Dental Association, and Donald A. Washburn, director of the Association's Library and Indexing Service Bureau, shown with the antique vase and ceremonial sword presented to the American Dental Association by the Japan Dental Association. Professor Okino also is chief editor of the Journal of the Japan Dental Association, chairman of the dental examiners of the Japan National Board and president of the Asian Dental Congress. He toured the United States, after attending the XIIth Dental Congress in Rome, to study graduate and postgraduate dental education programs.

Wylie, assistant dean and professor of orthodontics, University of California; Roy O. Greep, dean, Harvard School of Dental Medicine; Paul E. Boyle, dean, School of Dentistry, Western Reserve University; John V. Olson, dean, University of Texas, Dental Branch; Hamilton B. G. Robinson, associate dean, College of Dentistry, Ohio State University, and James T. Ginn, dean, College of Dentistry, University of Tennessee.

Members of the examining panels will include Allan G. Brodie, chairman of the orthodontics department, College of Dentistry, University of Illinois; Robert W. McNulty, dean, School of Dentistry, University of Southern California; Rene Rochon, dean, School of Dentistry, University of Detroit; Lester W. Burket, dean, Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; Raymond J. Nagle, dean, College of Dentistry, New York University, and William J. Simon, dean, College of Dentistry, State University of Iowa.

RELIEF FUND CONTRIBUTIONS EXCEED 80 PER CENT MARK

For the second consecutive year, contributions to the American Dental Association's Relief Fund exceeded the 80 per cent mark in the second month of the campaign. As of December 18, a total of $81,116.85 had been received toward the goal of $100,000.

Eight societies with quotas under $1,000 have exceeded their goals. These are Alabama, Alaska, Delaware, Hawaii, Nevada, New Mexico, North Dakota and the U.S. Public Health Service. Maryland and Tennessee, each with quotas of more than $1,000, have already contributed more than their goals.

R. H. Bleier, Milwaukee, chairman of the Council on Relief, predicted that the current campaign may be the largest in the history of the Association's Relief Fund. He said: "I know that every dentist realizes the good that his contribution does in making assistance available for his less fortunate colleagues."

All administrative costs of the Fund are absorbed by the Association, thus insuring that every dollar will be used for relief purposes.

Contributions may be mailed to the American Dental Association Relief Fund, 222 E. Superior St., Chicago 11.

PRESIDENT ALSTADT FILLS COUNCIL VACANCIES

William R. Alstadt, president of the American Dental Association, has announced the following appointments for vacancies on various Association councils:

Council on Constitution and Bylaws: Frank Jordan, Louisville, Ky., 1959 (ad interim), to succeed F. A. Pierson, resigned.

Council on Dental Health: Donald H. Miller, Elmira, N. Y., 1958 (ad interim), to succeed G. H. Proper, resigned.

Council on Dental Therapeutics: Walter W. Stevens, Poughkeepsie, N. Y., 1960 (ad interim), to succeed Edward F. Mimmack, resigned.

Council on Dental Trade and Laboratory Relations: J. Eugene Ziegler, Los Angeles, 1959 (ad interim), to succeed John Steen, resigned.

Council on Insurance: Harold M. Flickinger, Siloam Springs, Ark., 1958 (ad interim), to succeed J. S. Eilar, resigned.

REVISED "DENTAL REMEDIES" READY FOR MAILING

Enlarged, improved, reorganized and thoroughly revised, the official American Dental Association handbook on therapeutics, *Accepted Dental Remedies*, 1958 edition, is ready for distribution.

An important new chapter in the handbook is "The Management of Patients

Receiving Medical Care." Enlarged and improved chapters include "Handling of Emergencies in the Dental Office" and "Prescription Writing." Portions of the book that have been revised and brought up to date are "Local and General Anesthetics and Analgesics," "Sedatives and Hypnotics," "Antibiotics," "Sterilization and Disinfection of Instruments" and "Fluoride Dentifrices and Nutrition."

Cost of the 1958 edition is $3 a copy. An order form appears on page A-20 of this issue.

COPIES OF ADA DIRECTORY STILL AVAILABLE

Names and addresses of over 100,000 dentists are listed both alphabetically and geographically in the 1958 edition of the *American Dental Directory*. Complete and up-to-date information on each dentist listed, including Association membership status, age, character of practice, dental school attended and year of graduation, makes referral of patients a simple matter.

Also included in the new edition is a reference section which contains names and addresses of educational institutions and key personnel in dental organizations. Another feature is the list of national and state board requirements, hospital internships and residencies.

A limited quantity of the 1958 edition of the *American Dental Directory* is still available. An order form appears on page A-50 of this issue.

Dental Education

VIRGINIA INVITES BIDS FOR GRADUATE FELLOWSHIPS

Qualified dental graduates who are interested in preparing for careers as teachers or in research are invited to apply for one of the fellowships available at the Medical College of Virginia, School of Dentistry. This program is supported in part by the National Institute of Dental Research, and each fellowship carries with it an annual stipend of $5,000.

Applicants may be accepted as candidates for the M.S. or Ph.D. degrees. In order to obtain such degrees, a trainee is required to major in a basic science, including anatomy, biochemistry, microbiology, pathology, pharmacology or physiology. The trainee may also select a clinical discipline to be carried along with the basic science major.

Complete details are available from H. T. Knighton, director of graduate and postgraduate studies at the school, Richmond 19, Va.

BETH ISRAEL PLANS COURSE IN PERIODONTICS

A two-week seminar on periodontics is scheduled for March 17 to 28 by the dental department of the Beth Israel Hospital, Boston. All the technics employed in periodontal therapy as well as theoretical background will be included in the lectures, demonstrations and clinics. The tuition fee is $350. Application blanks are available from the hospital's director of public relations and education, 330 Brookline Ave., Boston 15.

INDIANA TO GIVE REFRESHER COURSE FOR ASSISTANTS

Technics at the desk and at the chair will be reviewed and improved during a two-day refresher course for dental assistants at the Indiana University School of Dentistry, Indianapolis. The program, to be offered February 12 and 13, will include

topics such as bookkeeping, records and recalls; roentgenographic technics; telephone technics; the role of the dental assistant in preventive dentistry and in the newer technics for cutting tooth structure; assisting in endodontic therapy, pedodontics, surgery and in complete denture construction, and new ideas in dental materials.

The fee for the course will be $10. Application blanks may be obtained from the office of the dean, 1121 W. Michigan St., Indianapolis.

TREATMENT OF HANDICAPPED SUBJECT OF SEMINAR

"Operative Dentistry Under General Anesthesia for the Handicapped Patient" is the topic of a two-day postgraduate course to be given on consecutive Wednesdays, February 26 and March 5, by the Albert Einstein Medical Center in cooperation with the Philadelphia Dental Study Club. This course, designed for dentists whose patients have a major health problem and must receive total treatment under a general anesthetic, will consist of lectures, demonstrations and a closed circuit telecast.

Requests for registration blanks should be directed to the Center's department of medical education, executive offices, York and Tabor Rds., Philadelphia 41.

SCIENCE BUILDING DEDICATED AT FAIRLEIGH DICKINSON

A five-story structure of brick and enameled steel was formally dedicated in October at the Teaneck, N. J., campus of Fairleigh Dickinson University. Known as the Science Building, the new addition houses both the School of Dentistry and the School of Engineering and Science.

The clinical facilities of the dental school occupy the entire main floor and include 77 units. The technic laboratories also are on the ground floor with the basic science laboratories on the second floor.

Started in 1956, the School of Dentistry has a current enrollment of 92 dental students and 53 dental hygiene students with a faculty of over 50 full and part-time instructors. Walter A. Wilson is dean of the dental school.

ADVANCED STUDIES OFFERED FROM COAST TO COAST

California • Tumors and infections of the oral cavity is the subject of a two-day refresher course being offered by the University of California School of Dentistry on February 28 and March 1. Infections of the head, neck and oral cavity, of dental origin, will be thoroughly covered. Tuition is $50, and enrollment closes February 20. Checks can be made payable to Ben W. Pavone, the University's director of postgraduate education, Third and Parnassus Aves., San Francisco 22.

Fairleigh Dickinson University dedicated its Science Building, which houses the School of Dentistry, in October.

Georgetown • A three day course in orthodontics for the general practitioner will begin on January 31 at the Georgetown University School of Dentistry, Washington, D. C. Major emphasis of the course will be on the role that functional disturbances play as major contributing factors of irritation in periodontal disease and how occlusal and incisal corrections are associated with the health of periodontal tissues. Tuition will be $75. Application blanks may be obtained from the University.

Illinois • Three short postgraduate courses of particular interest to the general practitioner will be given during the winter and spring months. A two-day class in routine oral surgery problems will be offered on January 31 and February 1. On February 6, there will be a course on recent changes and current ideas in dental roentgenography. Dentistry for children is the subject of the course to be offered from March 31 to April 4. Registration for all courses will be limited. Additional information, including tuition rates, may be obtained from the University of Illinois College of Dentistry, 808 S. Wood St., Chicago 12.

Marquette • A five-day refresher course on clinical occlusion will be offered January 15 to 19 and repeated from January 21 to 25. An advanced two-day course will then be given January 27 and 28. Purpose of the five-day course is to discuss the fundamentals pertaining to the physiology and biology of the stomatognathic system. The advanced course is designed to enable each class member to apply the technics demonstrated in the basic course. Each course will be limited to 16 participants. Tuition for the basic course is $150, and $60 for the advanced course. Application for enrollment should be made to the University's School of Dentistry, division of postgraduate studies, 604 N. 16th St., Milwaukee 3.

Other postgraduate refresher courses being offered and their dates are crown and bridge, three consecutive Wednesday afternoons beginning January 29; full denture prosthesis, February 19, 22 and 26 and March 1, 5, 8, 12, 15, 19 and 22; roentgenographic technic, February 17 and 18, with a special presentation on interpretations on February 19; dentistry for children, February 25, and exodontics and minor oral surgery, February 17 to 21.

New York • Four lecture and six clinical demonstration sessions on periodontics and oral medicine will be given by the New York University College of Dentistry beginning Wednesday, February 12 and continuing for ten successive Wednesdays. Tuition, books and instrument fees will be $211.50. Additional information may be obtained from the secretary, postgraduate division, 209 E. 23rd St., New York 10.

Oregon • Nutrition, clinical application of dental materials, new ideas in dentistry and the handling of psychological problems in the dental practice will be the topics of four two-day refresher courses to be presented by the Dental School of the University of Oregon. Dates of the courses are January 13 and 14, January 15 and 16, January 27 and 28, and January 29 and 30, respectively. Tuition varies from $25 to $40. Further information is available from Vinson M. Weber, head of the University's department of postgraduate education, 611 S.W. Campus Dr., Portland 1, Ore.

Pennsylvania • The School of Dentistry of the University of Pennsylvania has announced its postgraduate refresher courses for February and March. These will include: hydrocolloid indirect technic for inlays and bridges, February 8 and 9; principles of occlusion, February 19 to 21; partial dentures, February 24 to 28; the mandibular third molar, March 3 to 7, and extraoral tracers in rehabilitation of function, March 24 to 26. Details are available from the school's department of postgraduate courses, 4001 Spruce St., Philadelphia 4.

Southern California • January and March are the months selected for the presentation of a postgraduate seminar for the dentist who wishes an up-to-date review of current thinking. The course, to be offered January 13 to 17 and repeated March 10 to 14, will include all-day sessions on increased speeds, operative dentistry, esthetics and phonetics in full denture construction, diagnosis and design of internal and semiprecision attachments, and periodontal problems. Tuition is $170 and enrollment will be limited to ten. Applications may be obtained from the division of postgraduate instruction of the University of Southern California School of Dentistry, University Park, Los Angeles 7.

Dentistry for children will be the topic of a five-day refresher course to be offered from February 23 to 28 by the dental school. Enrollment will be limited to 16 and tuition will be $150. Applications must be submitted by February 7.

Tufts • Three postgraduate refresher courses will be offered by the Tufts University School of Dental Medicine in March and April. Occlusal rehabilitation will be presented from March 3 to March 7 as a lecture and seminar

course. Tuition will be $250 and enrollment will be limited. On Wednesday, March 5, and continuing each Wednesday for eight weeks, the school will offer a course in minor oral surgery. Tuition will be $150 and the class limited to 15. High speed instrumentation will be discussed during a three-day refresher course from March 17 to 19. Tuition will be $100 and enrollment will be limited to 12. Further information and application blanks are available from the university's director of graduate and postgraduate studies, 136 Harrison Ave., Boston.

Virginia • The Medical College of Virginia, School of Dentistry, will offer postgraduate courses in periodontics beginning in September. These programs, both one and two years in length, will be designed to prepare the dental graduate for specialty practice in periodontics and to qualify applications for admission to examination by the American Board of Periodontology.

Washington • Oral physiology, dental ceramics, surgical anatomy of the head and neck and etiology and diagnosis of pain of dental origin, cancer of the oral region, crown and bridgework, analysis and treatment of adult dental occlusion, and exodontics and minor oral surgery are among the subjects that will be offered by the department of postgraduate dental education of the University of Washington School of Dentistry during the winter and spring months. Inquiries and additional details may be obtained from the director of postgraduate dental education, Seattle.

Western Reserve • Psychodynamics and practice administration in dentistry will be the first of a continuing series of postgraduate courses recently inaugurated by the School of Dentistry of Western Reserve University. This will be a three-day course, to be held April 21 to 23. Further information may be obtained from Philip Burwasser, director of postgraduate education at the University, Cleveland 6.

Dental Societies

ST. LOUIS SOCIETY LAUNCHES TV LECTURES FOR DENTISTS

Operative dentistry, roentgenograms, children's dentistry, orthodontics, oral surgery, oral medicine, prosthetics and professional ethics are among the subjects to be discussed in a series of live TV lectures, directed to the dentist, over KETC—the educational station in St. Louis. Sponsored by the St. Louis Dental Society, this series of 20 programs will be presented on alternate Wednesday evenings from 7:30 P.M. to 8:00 P.M.

The series is the result of two years of planning, and is the first of a three year program. Next year's programs will be directed to approximately 200,000 school children in the classroom, and the third year the programs will be beamed to the general public.

Members of the committee preparing the series are John Versnel, chairman, William S. Brandhorst, Joseph M. Grana, R. H. Miller, Jr., Stephen Forrest and Leroy Boling. Producer of the series is James E. Brophy, executive secretary of the St. Louis Dental Society.

While attending the Pacific Coast Dental Conference, William Alstadt (l.), then president-elect of the American Dental Association, received the key to the city from San Diego's mayor (center), Charles Dail. Conference president, Phillip Tennis, is at the right.

Arthur F. Schopper, Association Trustee, Sixth District, and the Rev. Francis J. O'Reilly, vice-president, St. Louis University, exchanged viewpoints during the Mid-Continent dental meeting in St. Louis.

Public Health

LATEST STUDY RESULTS SHOW FLUORIDATION "NOT HARMFUL"

On the basis of an exhaustive new study, the American Medical Association reports that fluoridation of public water supplies is "not harmful to the general health" of the population. The slight mottling of tooth enamel evident in a small percentage of individuals after prolonged exposure is outweighed by the reduction in caries that children up to ten years of age exhibit.

The American Medical Association report came exactly one year after the adoption of a resolution by its House of Delegates, at the Seattle meeting, directing two councils—the Council on Drugs and the Council on Foods and Nutrition—to study all available information concerning the fluoridation of public water supplies and to make recommendations.

The closing paragraph of the 27-page report, which was approved by the American Medical Association's Reference Committee, contained the following conclusion:

"Fluoridation of public water supplies should be regarded as a prophylactic measure for reducing tooth decay at the community level and is applicable where the water supply contains less than the equivalent of 1 ppm of fluorine."

This new study and its findings are essentially the same as the report issued in 1951 by the same two councils. At that time, the American Medical Association report said, "the Councils believe that the use of drinking water containing up to one part per million of fluoride is safe."

In evaluating their yearlong study of fluoridation, the Council on Food and Nutrition and the Council on Drugs of the American Medical Association presented the following conclusions which were approved by the House of Delegates of that organization:

1. Fluoridation of public water supplies so as to provide the approximate equivalent of 1 ppm of fluorine in drinking water has been established as a method for reducing dental caries in children up to 10 years of age. In localities with warm climates, or where for other reasons the ingestion of water or other sources of considerable fluoride content is high, a lower concentration of fluoride is advisable. On the basis of the available evidence, it appears that this method decreases the incidence of caries during childhood. The evidence from Colorado Springs indicates as well a reduction in the rate of dental caries up to at least 44 years of age.

2. No evidence has been found since the 1951 statement by the Councils to prove that continuous ingestion of water containing the equivalent of approximately 1 ppm of fluorine for long periods by large segments of the population is harmful to the general health. Mottling of the tooth enamel (dental fluorosis) associated with this level of fluoridation is minimal. The importance of this mottling is outweighed by the caries-inhibiting effect of the fluoride.

3. Fluoridation of public water supplies should be regarded as a prophylactic measure for reducing tooth decay at the community level and is applicable where the water supply contains less than the equivalent of 1 ppm of fluorine.

DENTAL HEALTH GROUP ELECTS OFFICERS AT ANNUAL MEETING

Elected to serve as officers of the Dental Health Section of the American Public Health Association for the coming year are Linwood G. Grace, director of the Bureau of Dental Health, Pennsylvania Department of Health, Harrisburg, chairman; David F. Striffler, director of the Division of Dental Health, New Mexico State Department of Public Health, Santa Fe, vice-chairman, and Donald J. Galagan, Division of Dental Public Health, Public Health Service, Washington, D. C., secretary. The elections were held during the annual meeting of the American Public Health Association in November at Cleveland.

New officers of the association include Roy J. Morton, associate leader of the waste disposal research and engineering section of the Oak Ridge National Laboratory, who was elected president. Dr. Morton succeeds John W. Knutson of Washington, D. C., chief dental officer of the U. S. Public Health Service and first dentist to be president of the organization. Dr. Leona Baumgartner, commissioner of health, New York City, was chosen president-elect. Dr. Berwyn F. Mattison of Harrisburg, Pa., was named executive secretary. He succeeds the late Dr. Reginald M. Atwater who had held this position for 22 years until his death in October. Dr. Mattison is secretary of health for the state of Pennsylvania.

TOPEKA JOINS LIST OF FLUORIDATED COMMUNITIES

Topeka, with a population of 114,000, is the twenty-seventh Kansas community to subscribe to a program of controlled fluoridation. The program was initiated in the capital city of Kansas late last summer after the adoption of an ordinance by a unanimous vote of the city commission, providing for the fluoride adjustment of the Topeka water supply.

International

GERMANY ELECTS FIFTEEN DENTISTS TO LEGISLATURE

During recent elections in Germany, 15 members of the dental profession were chosen to sit in the House of Representatives. The successful campaigners and their districts include: Richard Temblé, Westerland/Sylt; Christian Lackemann, Pattensen/Leine; Siegfried Bärsch, Bremen; Heinz Petermann, Borghorst; Hans Modschiedler, Gronau/Westfalen; Hanne Hagemann, Herborn; Hans Link, Bottenhorn; Hermann Eymann, Pirmasens; Karl Braun, Schwann/Calw; Wolfgang Seiler, Rechberghausen/Württemberg; Erhard Weoss, Unterköblitz; Josef Bachseitz, Sünching; Karl Seif, Cham; Fritz Haselmayr, Fischach, and Karl Löffelmann, Völkinghausen/Saar.

NEW TEACHING CLINIC OPENED AT DENTAL SCHOOL IN ISRAEL

Thirteen students enrolled for classes at the new teaching clinic of the Hebrew University School of Dentistry in Jerusalem, which was officially opened for the academic year 1957-58.

The clinic will be used for instruction in restorative dentistry, prosthetics and oral surgery until the school moves into its permanent home in the Hadassah—University Medical Center at Ein Karem. The clinic has 18 chair units, including three for oral surgery, a modern roentgenographic laboratory, a basic technics laboratory, a lecture hall and a dental library.

CARLOS ANDREU HEADS GUATEMALAN DENTAL SOCIETY

Members of the board of trustees of the Dental Society of Guatemala for the 1957-58 term include the following: Carlos Andreu, president; Guillermo

Zachrisson, vice-president; Arturo Zepeda A., secretary; Enrique Peralta, treasurer; Donald Byrne M., assistant secretary, and Guillermo Amado, librarian.

National Defense

ARMED FORCES INSTITUTE PLANS PATHOLOGY COURSE IN MARCH

The dental and oral pathology branch of the Armed Forces Institute of Pathology, Washington, D. C., will present its annual course in "Pathology of the Oral Regions" during the week of March 24 to March 28. This year emphasis will be placed on malignant neoplastic disease. Color television will be a feature of the course.

Applications of those in the various federal dental corps may be processed through the normal channels. Civilians interested in enrolling for this course may apply to Col. Joseph L. Bernier, DC, chief, dental and oral pathology branch, at the Institute.

Recent visitors to the U.S. Naval Dental School, National Naval Medical Center, Bethesda, Md., were Colonel Augustin L. Zarate, chief of the dental service of the Armed Forces of the Republic of the Philippines and Major Antonio Gonzales, the Military Attache at the Philippine Embassy. Shown (l. to r.) in the picture are: Capt. C. W. Schantz (DC), commanding officer, Dental Corps, U.S. Navy; Col. Zarate; Maj. Gonzales and Capt. E. G. F. Pollard (DC) USN.

General

NORTHWESTERN TO PRESENT CLOSED CIRCUIT TELECAST

The use of high-speed cutting devices will be demonstrated on January 29 at the Northwestern University Dental School, Chicago, by means of a closed circuit color telecast from Washington.

Moderated by Col. Joseph L. Bernier, the program will originate from the Armed Forces Institute of Pathology at Walter Reed Medical Center. It will be received at Thorne Hall, Lake Shore Dr. and Superior St. All members of the dental profession are invited to attend the sessions which will be presented from 10 A.M. to noon and from 2 P.M. to 4 P.M.

UN STAFF SUBSCRIBES TO DENTAL INSURANCE PLAN

On December 14, 1957, the General Assembly of the United Nations approved a contributory program of dental insurance for 3,500 employees of the United Nations Secretariat and specialized agencies, and their dependents. The United Nations staff thus will become the first large group in the world to subscribe to a voluntary, community-wide dental prepayment plan.

Coverage is being provided by Group Health Dental Insurance, Inc., and cost of the coverage will be shared by the United Nations and its employees.

Major emphasis of the plan is on prevention. The plan also provides immediate benefits toward coverage of existing defects.

R. H. ATWATER, PUBLIC HEALTH LEADER, DIES

Dr. Reginald M. Atwater, who served as executive secretary of the American Public Health Association for 22 years, died on October 18 at the age of 65.

Dr. Atwater received his M.D. degree from Harvard University, and then was a Rockefeller Foundation Fellow in public health taking the Master of Public Health and Doctor of Public Health degree at Johns Hopkins University School of Hygiene and Public Health.

He went to China under the Yale in China program and served as associate professor of preventive medicine and public health in Hunan Yale College of Medicine, Chungsha, China.

Dr. Atwater became executive secretary of the American Public Health Association in 1935. He also served as managing editor of the *American Journal of Public Health*.

Hermann Prinz

He was past president of the First District Dental Society of Pennsylvania and a life member of the Philadelphia Academy of Stomatology.

HERMANN PRINZ DIES AFTER LONG ILLNESS

Dr. Hermann Prinz, professor emeritus of pharmacology in the School of Dentistry at the University of Pennsylvania, died on November 24 at the age of 89.

Dr. Prinz, a native of Germany, became a member of the University faculty in 1913, serving first as professor of materia medica and therapeutics. He became emeritus professor of pharmacology in 1938.

A prolific writer, Dr. Prinz was internationally known for his textbooks, *Materia Medica, Diseases of the Mouth* and *A Dental Formulary*.

Dr. Prinz was the recipient of numerous honors, among them the honorary degree of Master of Arts from the University of Michigan; the honorary degree of Master of Science from the University of Pennsylvania and the honorary degree of Doctor of Medical Dentistry from the University of Cologne. He was the first United States dentist to be elected to the Leopold-Carolinian Academy of Scientists (Germany), and also was the recipient of the Jarvie Medal, the Callahan Memorial Award and the Jenkins Memorial Medal.

THOMAS SPEIDEL, UNIVERSITY OFFICIAL, DIES

The head of the division of orthodontics at the University of Minnesota School of Dentistry, Thomas D. Speidel, died after a heart attack on November 30. He was 49 years of age.

A graduate of the University of Iowa, Dr. Speidel was an assistant professor of dentistry in charge of orthodontics at the University of Tennessee, an associate professor of orthodontics at the University of Iowa, a professor at the University of Indiana School of Dentistry and dean of the School of Dentistry at Loyola University, New Orleans, before joining the faculty at Minnesota.

Dr. Speidel was editor of the *Journal of Dental Education* from 1940 to 1947. He also had been a director of the American Association of Orthodontists.

MRS. ANITA JONES, WIFE OF ASSOCIATION TRUSTEE, DIES

Mrs. Anita Jones, 60, wife of Earl G. Jones, Trustee from the Seventh District, died December 12 in Mt. Carmel Hospital, Columbus, Ohio. In addition to Dr. Jones, she is survived by two daugh-

ters, Mrs. Joanne Howard of Marion, Ohio, and Mrs. Barbara Taylor of Lancaster, Ohio; her mother, Mrs. Cora E. Thomas, and four grandchildren.

Funeral services were held in Granville, Ohio.

GOLD FOIL CLUB TO DISCUSS BLACK'S CONTRIBUTION

Association members and students of the three Chicago dental schools are being invited to attend a meeting of the G. V. Black Gold Foil Study Club at the Northwestern University Dental School on January 31.

The significant contribution of G. V. Black will be discussed by Robert E. Blackwell, professor emeritus of operative dentistry at Northwestern University. Other participants will include Lester E. Myers, president of the American Academy of Gold Foil Operators; Rex Ingraham, University of Southern California; Arne F. Romnes, Chicago, and Paul T. Dawson, Chicago.

MIDWEST PERIODONTISTS FORM SOCIETY; MEET IN FEBRUARY

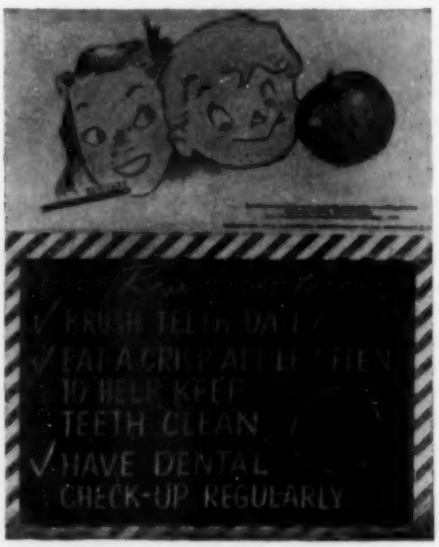
Chicago's Northwestern University Dental School will be the site of the first winter sessions of the newly forming Midwest Conference of Periodontists.

The conference, to be held February 2 and 3, will include both organization sessions as well as a group participation symposium on the dynamics of periodontal bone. Joseph P. Weinmann, chairman of the department of oral pathology at the University of Illinois College of Dentistry, will serve as discussion leader.

Preliminary presiding co-chairmen for the society are Irving C. Stone, Chicago, and Jack C. Penticuff, Kansas City, Mo.

HYGIENISTS' HEADQUARTERS MOVES TO CHICAGO

Effective December 15, the offices of the American Dental Hygienists' Association were moved from 1735 Eye St., N.W., Washington, D. C., to 100 E. Ohio St., Chicago.



Publicity material, issued by the International Apple Association, Inc., and endorsed by the American Dental Association, will be available to remind patients and school children of National Children's Dental Health Week, February 2-8. The 11-inch by 14-inch poster shown is available for classrooms, dental offices and clinic dental rooms on the basis of one per room. An apple leaflet, "Nature's Toothbrush," also is available for distribution upon request to the International Apple Association, Inc., 1302 18th St., N.W., Washington 6, D. C. Supplies are limited.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

DENTIST EXTOLLS MERITS OF VERTICAL BRUSHING

This is a reaction to the comments presented by Dr. C. W. Garleb in the November 1957 issue of THE JOURNAL wherein he challenges the merits of vertical toothbrushing.

Teeth, like the spokes of a wheel or tines of a fork, are more easily cleaned in the direction of the long axis. Dr. Garleb's only explanation of normal failure of patients to brush well is that "Vertical brushing is awkward, slow and difficult, and thus people are discouraged from using it." Granted, this is a valid objection when the conventional toothbrush is used. However, for over 30 years, there has been on the market a brush with an adjustable head that can be turned to any angle so that vertical brushing is comfortable, fast and easy. Patients are really enthusiastic about the success of their mouth cleansing.

I have been in practice since 1911. For the past 27 years, I have used the Clean-Be-Tween toothbrush and prescribed it to all of my patients. In many lectures on office practice I have acquainted scores of dentists with this exceptional tool. I use the hardest nylon bristles I can get with the result that my mouth is clean and healthy at 68 years of age.

I would be thrilled to have Dr. Garleb try the Clean-Be-Tween way.

W. N. Miller, Flint, Mich.

LARGE CLASSES DECREASE EFFECTIVENESS OF EDUCATION

In response to the comments by Dr. E. H. Dildy of the Arkansas Society for Clinical Hypnosis, which appeared in the September 1957 issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, it is true that the three-day seminar type of postgraduate training has indeed sparked the incentive for much individual and collective study on the subject of hypnosis, "or any other topic." This is worthy of mention. However, according to most advanced material on the subject of teaching, it is a recognized fact that small groups, individually trained, result in a higher score for understanding and learning.

I quote from an article by Ernest W. Cherrington, Jr., entitled "How Many Can We Teach?" which was published on page 90, vol. 26 (1955) of the *Journal of Higher Education:* "My experience shows that a class of 20 students is the best size. We get more done, we progress faster, we have more discussion. The student learns more efficiently in a class of 20. As the number increases, the rate of learning decreases.

"Education is 'a personal matter' wrote President Nis Y. Wessell of Tufts College recently. 'Nowhere is this more true than at the college and university level. Individualized education is most readily achieved when there is an intimate relation between teacher and pupil.' "

If, Dr. Dildy, the society members had interpreted the article (see THE JOURNAL "Training in Hypnodontics," page 501, October 1956) in unbiased fashion, they would understand that there was no criticism of either the material offered or the instructors. These same seminars, material and instructors, however, could undoubtedly do a magnificent job if the attendance was reduced from groups of 100 or more to possibly 10 or 12, or even 20. It is conceivable that this personal training would be better than similar instruction given to a larger group. Furthermore, this "better package" is available at a price that most dentists can afford.

Philip Ament, Editor, The Journal of the American Society of Psychosomatic Dentistry

HOT SALT STERILIZER FOR ENDODONTIC INSTRUMENTS

The Flaherty molten metal sterilizer was introduced about 1920 for sterilizing root canal instruments and other endodontic materials. The molten metal sterilizer has a tendency to cause the formation of dross which must be wiped from its surface every few minutes. This is somewhat of a nuisance. What is more serious is that the fine particles of metal cling to the root canal or absorbent point which, if unobserved, may be accidentally introduced into the root canal and cause blockage. In recent years, glass beads have been substituted for the molten metal. Although this was an improvement, it still left something to be desired because small glass beads have also been carried into the root canal.

During the last two years or so I have used plain ordinary table salt instead of molten metal, keeping the salt at a temperature between 425° and 475° F. At this temperature root canal instruments may be sterilized in five seconds, and cotton pellets and absorbent points in ten seconds under conditions of clinical use. It is understood, of course, that all root canal instruments must be clean and dry before immersion in the hot salt sterilizer. Any particles of salt that might be introduced into the root canal are readily washed out with any irrigating solution, and can do no harm even if carried through the apical foramen.

The "over the Bunsen flame" type of sterilizer can be converted readily into a hot salt sterilizer in the following manner. A little water is poured into a paper cup. An empty paper cup is set inside it and the metal is melted in a molten metal sterilizer and poured into the paper cup. The water in the lower cup will chill the metal and form an ingot. The well of the sterilizer is cleaned and filled with table salt, a thermometer is introduced into the well, and the flame (about 1-inch high) is regulated to maintain a temperature between 425° and 475° F.

The electrically heated glass bead sterilizers generally provide an adequate temperature and it is simply a matter of substituting salt for the glass beads. However, a thermometer should be placed in the salt to check on the temperature. The old style electrically operated molten metal sterilizer does not provide sufficient heat for conversion to a hot salt sterilizer.

The table salt should be replaced about once a month as the crystals tend to conglomerate and become caked. Small conglomerates of salt can readily be broken with a mirror handle, but larger conglomerates are preferably replaced.

Louis I. Grossman, Philadelphia

Book Reviews

ORTHODONTICS

By J. A. Salzmann, D.D.S., F.A.P.H.A. Two volumes: Volume I, Principles and Prevention. 381 pages, over 300 illustrations. Indexes, bibliography. $13. Volume II, Practice and Technics. 497 pages, over 500 illustrations. Indexes and bibliography. $20. Philadelphia, J. B. Lippincott Co., 1957.

The author has "mined" his 1950 edition of *Principles of Orthodontics* for much valuable material, but essentially these are new books in scope, organization and method of presentation. The initial volume, *Principles and Prevention*, is oriented toward the dental student and inquisitive practitioner, who realize the increasing importance of orthodontic philosophies and fundamentals in restorative and rehabilitative phases of routine practice. Yet the coverage is sufficiently detailed to serve as a valuable source book for orthodontic students and orthodontists themselves. The chapters on "Growth and Development" and "The Stomatognathic System" incorporate the latest study in the field, and emphasize the dynamic aspects of orthodontics. It is obvious that the author recognizes the vastness of the field, and the great amount of work that has been done recently in both research and clinical fields to advance the profession so rapidly. To this end, he has made an exhaustive study of all pertinent literature and culled the most valuable contributions for each chapter. Definitive subject bibliographies are incorporated at the end of each chapter. In addition, complete subject indexes and author indexes are found at the end of each volume. The *Principles and Prevention* volume emphasizes the fact that malocclusion is a public health consideration. Preventive orthodontic procedures are essential to begin to cope with this high incidence, widespread dentofacial aberration.

The volume on *Practice and Technics* deals with the knotty problems of diagnosis, mechanotherapy and posttreatment stabilization. The first two chapters amplify etiologic considerations that have been discussed in the companion volume, and stress the role of endocrinopathies. The portion on cephalometrics is the most complete and up-to-date handling of the subject yet encountered. The discussions of fixed and removable appliances are devoted to the twin-arch technic and edgewise philosophy primarily, as modified by different groups, but extraoral force, labiolingual technic, the Crozat appliance and the activator are adequately described.

Illustrations are profuse, though not always clear. This is a minor criticism, however. The remaining physical properties of the books—print size, margins, paper quality and binding—are excellent.

Both volumes are enthusiastically recommended for all orthodontists. The volume on *Principles and Prevention* should be on the book shelf of every dentist.

T. M. Graber

YEAR BOOK OF DENTISTRY: 1956-1957 SERIES

Edited by Stanley D. Tylman, Donald A. Keys, John W. Knutson, Harold J. Noyes, Hamilton B. G. Robinson and Carl V. Waldron. 480 pages with 300 illustrations. Index. $6. Chicago, Year Book Publishers, Inc., 1957.

The general practitioner or family dentist who looks for a ready reference work as an aid to practice will find these abstracts from current literature very useful. He will find particularly helpful the clarifying comments by Hamilton B. G. Robinson.

For purposes of orientation, the practitioner is introduced at once to oral diagnosis, an area in the field of dentistry which is assuming ever greater significance in prevention and therapy. This is followed by chapters on endodontics, periodontics, oral medicine, caries and hard tissue lesions, public health, orthodontics, surgery and related pathology, and restorative and prosthetic dentistry. Repeated emphasis is placed on the responsibility of the dentist in the early recognition of precancerous and early cancerous lesions.

Since more and more of the general practitioners, especially the more recent graduates, seek hospital affiliation, the information contained in the chapter on oral surgery is useful both in private office and hospital service. The essentials of operating room technics are summarized. The temporomandibular joint, anesthesia, psychosomatic problems, ideas of occlusion and other fundamental considerations of theory and practice are covered in this edition of the *Year Book*. In preventive oral surgery, preoperative and postoperative care is a responsibility of the dentist, no matter where he practices.

This book would be a more effective stimulus to continuing education, either by reading or by attending meetings and formal courses of instruction, if the subject matter were somewhat rearranged. Incorporation of the information on mouth lesions with nutritional, neoplastic, industrial and various body system backgrounds in a chapter on oral medicine, would be a case in point. It would facilitate shifting the emphasis from pathology to physiology. Oral diagnosis and oral medicine would help to place dental practice on a physiologic foundation.

Public health, unfortunately, is not very well understood by the profession generally. More dentists should become familiar with developments and programs as a social and professional responsibility, and the impact of public health on dental practice and patterns of service.

The subject index is a helpful guide to the text.

Charles F. Harper

MEDICAL WRITING

By Morris Fishbein, M. D. Third edition. 262 pages with 36 illustrations. Index. $7. New York, Blakiston Division of McGraw-Hill Book Company, Inc., 1957.

Since its first appearance in 1938, this book generally has been accepted as a standard in the field of medical writing. Probably almost every editorial office of a medical or dental periodical in the English-speaking world uses *Medical Writing* as a reference. It is well-organized, concise and accurate. Most medical and dental writers use (or should use) it in the preparation of manuscripts.

The book represents the gradual evolution of theory and practice on medical writing in the author's association with the editorial department of the American Medical Association for 37 years. The publisher has exactly characterized Dr. Fishbein's book as "a comprehensive compilation of the most recent, reliable information available for [the] preparation of medical and scientific manuscripts for books, articles, treatises, reports, and monographs."

The 18 chapters bear the following titles: an acceptable paper, style, the subject and the material, construction of a manuscript, words and phrases, spelling, capitalization, abbreviations, numbers, pharmaceutic products and prescriptions, bibliographic material, preparation of the manuscript, illustrations, tables and charts, revision of the manuscript, proofreading, indexing, and abbreviations of names of periodicals.

Several changes from the second edition of 1948 are apparent. Almost every chapter has been revised. The Latin terminology and the proofreading sections have been revised, additional degrees are listed, and the two former world lists of medical periodicals have been brought up to date, combined, and shortened.

The binding, paper, typography and format are of uniform excellence.

N. C. Hudson

THE FIGHT FOR FLUORIDATION

By Donald R. McNeil, Ph.D. 241 pages. Index. $5. New York, Oxford University Press, 1957.

The author, the associate director of the Wisconsin State Historical Association, has read very widely indeed and has checked his information carefully with such investigators as Frederick S. McKay and H. Trendley Dean. Dr. McNeil had access to the personal papers of the late John G. Frisch of Madison, Wis., Dr. McKay's papers, the correspondence of G. V. Black at Northwestern University, the facilities of the libraries of the American Dental Association and the American Medical Association, and the records of the Washington State Health Council. His style of reporting will be found refreshing to the reader.

The ten chapters, beginning with "Why the Stain?" and ending with "The Lines Solidify," an assessment of ten years of fluoridation, document the development of a new measure in the practice of public health while the measure still is controversial and information still is fresh and available. Dentists and others interested in the promotion of fluoridation will find this book scientifically accurate, informative and intriguing.

Kenneth A. Easlick

ORAL MEDICINE: DIAGNOSIS AND TREATMENT

By Lester W. Burket. Third edition. 558 pages with 351 illustrations and 10 color plates. Index. $14. Philadelphia, J. B. Lippincott Company, 1957.

Medical aspects of the practice of dentistry, based on the methods and contents of a long experience, are presented to students and practitioners in this book. According to the introductory remarks of Dr. Appleton, it is "comprehensive, authoritative and thoroughly practical." It is well written, easily under-

stood and, considering the subject matter covered, relatively brief. Therefore, it does not treat of the whole subject of medicine, but rather only those phases needed by and useful to the dentist in order to do a good job. The book is also an adequate source of information for physicians concerned with this field.

The book contains 12 sections in all, some of which are of exceptional interest or are somewhat outside of the conventional classification of medical subjects. These are, general considerations including medical-dental relations and the dental consultation; focal infection; dental pediatrics and gerodontics; occupational hazards in dentistry and industry, and laboratory aids in diagnosis. Each section is followed by an extensive and carefully selected bibliography; there is an unusually complete index, and the illustrations are both excellent and very helpful. In addition, there are 25 useful tables, a sample history sheet, a health questionnaire and a comprehensive chart of the oral manifestations of occupational diseases. This is an outstanding text for use by students and practitioners in both dentistry and medicine.

Edward H. Hatton

THE ALEUTIAN DENTITION: A CORRELATIVE STUDY OF DENTAL CHARACTERISTICS IN AN ESKIMOID PEOPLE

By Coenraad F. A. Moorrees. 196 pages with 41 illustrations and 49 tables. Index. $4.50. Cambridge, Harvard University Press, 1957.

In this first effort to present his thoughts and work in book form, Moorrees has made a singular success. He has vitalized the subject of dental anthropology with a style and presentation that lifts it out of the class of tedious recital of structure and measure which characterizes so many books dealing with this subject.

The elements of the dentition usable in comparative studies are simply and carefully explained, the past literature on each is reviewed and finally the Aleutian material is used as an immediate example in the total picture of man's dental structure.

In addition to the morphological approach, Moorrees has interesting and comprehensive chapters on tooth emergence, occlusion, dental disease and nutrition of the Aleuts.

"The role of hereditary factors in the multifactorial etiology of dental caries" Moorrees says, "is extremely difficult to appraise with the methods of analysis available today, as it is virtually impossible to separate the influence of heredity factors from those of the environment." He says there has been some progress in this area through studies of monozygotic and dizygotic twins. Further, he conjectures that the increase in dental disease among the Aleuts in the past half-century is probably due partly to the poorer quality of the structure produced in the modern individuals and the great increase in the refined carbohydrate intake.

One attractive feature of the book is the assembly of all the illustrations and charts at the front of the book, before the text. Clear, large type and good pertinent illustrations make for easy reading.

Albert A. Dahlberg

SPEECH DISORDERS: PRINCIPLES AND PRACTICES OF THERAPY

By Mildred Freburg Berry and Jon Eisenson. 573 pages with 54 illustrations. Index. New York, Appleton-Century-Crofts, Inc., 1956.

This book is a comprehensive work on speech disturbances and speech disorders. It presents all phases of the principles and practices of speech therapy—the physiology of natural speech and its development, the causes and aspects of abnormal speech, including stuttering, and the treatment for all types of speech disorders. Because of its comprehensive character and systematic organization, the work will serve not only as an introduction for the beginning student or teacher, but as a most reliable reference book for the professional man. The dentist, especially the dentist who has child patients, will find it a valuable book for his library shelf.

Although the book does not devote much space to purely dental causes of speech disorders or to the part a dentist should play in speech therapy, there are occasional passages of special interest to the pedodontist and orthodontist.

The following paragraph regarding children with cleft palate exemplifies the authors' recognition of the necessity for cooperation among the different professions including dentistry:

"As the teeth erupt, the pedodontist discusses his concern, the prevention of dental caries. Because of a prolonged soft diet and the tendency of parents to allow a high glucose and low protein intake, rampant caries is the typical picture. Here both the social worker

and the psychologist must join with the pedodontist in parental and child-education programs designed to promote oral hygiene. The orthodontist also needs the help of the social worker and the psychologist. Dental malformations and malocclusions are the rule rather than the exception in these children. In any traumatic zone, heightened sensitivity may result, but this is particularly true of an insult to the oral area since it possesses the most highly developed sensitivity at birth. The oral area of a cleft-palate child usually is subjected to more or less constant insult. One can understand why these children show great resentment toward any further tampering with the mouth. The family, the professional team, and the child must understand and learn how to cope with these normal reactions to injury. Once again, the psychologist and the social worker can render an indispensable service."

Fern Billingsley Denton

ORAL DIAGNOSIS AND TREATMENT
(ORAL MEDICINE)

By Samuel Charles Miller, D.D.S., and 37 contributors. Third edition. 977 pages with 577 illustrations and 30 color plates. Index. $16. New York, Blakiston Division, McGraw-Hill Book Co. Inc., 1957.

The first and second editions of this work met with such an enthusiastic reception, that a third edition incorporating additional up-to-date material was inevitable. This new edition follows the same general format as that of preceding editions; however, the book contains so many important changes and additions that it is, in effect, a new work. The revisions and added material keep pace with the advancements in the field of oral medicine without necessarily making the book too unwieldy. The text is printed in a clear, concise and stimulating manner that makes for easy reading.

An outstanding new feature is the chapter titled "Identification Keys as Diagnostic Aids." This is the first time that a differential key of this type has been prepared for any text.

At the conclusion of each chapter there is a series of questions pertinent to the text. These questions are framed thoughtfully, and are designed to help the reader. An adequate bibliography and suggested reading list follows, making each chapter a compact and coherent entity.

Although the book has many contributors, it is really the product of a close working team. It reflects uniform rather than competitive thinking. This uniformity is preferable because the material can be readily assimilated by the student. It is a practical presentation of the various subjects, with contributions from men experienced and well-respected in their fields. The book admirably fulfills its purpose. The illustrations and descriptions are sufficiently complete for the average problem encountered in general practice. In fact, some of the colored plates are practically a diagnostic lesson in themselves. There is an excellent index.

Doctor Miller is to be congratulated on his method of organization. The numerous diagrams and illustrations, and the avoidance of controversial matter in the book is indicative of his wide experience and ability as an author.

The publisher and printer are to be commended on the physical quality of the book, the readability of the printing, excellence of the illustrations and the quality of the paper. No effort has been spared to produce a volume of which they may well be proud.

This book, containing such a wealth of material, can be recommended highly to teachers, students and practitioners of dentistry and medicine. It is a veritable storehouse of information.

E. Alan Lieban

LOCAL ANESTHESIA AND PAIN CONTROL
IN DENTAL PRACTICE

By Leonard M. Monheim, D.D.S. 299 pages with 128 illustrations. Index. $8.75. St. Louis, C. V. Mosby Co., 1957.

All aspects of controlling dental pain are presented in this comprehensive volume. Although it is written by a well recognized specialist in dental anesthesiology, it is directed particularly to the general practitioner.

The first chapter presents various aspects of total pain experience with identification of practical analgesic procedures where applicable. This is followed by a chapter on anatomical and functional descriptions of the innervation of the dental field with excellent illustrations and organizational tables.

The text continues with descriptions of dental anesthetic technics and compounds, complications and emergencies. Advice on patient evaluation and anesthetic selection is presented.

Other chapters discuss those analgesic drugs appropriate for use before and after dental procedures. Preanesthetic medication with sedative drugs and treatment are considered separately. Consideration of armamentarium,

sterilization and the medicolegal aspects of regional analgesia also are included in this volume.

Any dentist who reads this book will appreciate the logical as well as technical quality of the presentation. Specific mention of representative drugs and instruments, where appropriate, add to the usefulness of this volume.

Stanley C. Harris

CLINICAL PHYSIOLOGY: THE FUNCTIONAL PATHOLOGY OF DISEASE

Edited by Arthur Grollman, M.D., Ph.D., F.A.C.P. 854 pages with illustrations. Index. $12.50. New York, Blakiston Division McGraw-Hill Book Co., Inc., 1957.

Experts in functional pathology of disease have made an important contribution to that field by means of this book which stresses the physiological knowledge applicable to clinical medicine. The term physiologic really includes many other fields—biochemical, pathological, pharmacological and bacteriological sciences. Greatest emphasis is placed on the recent advances in metabolic, cardiovascular and endocrine fields. Results of laboratory experimentation and clinical research have been correlated so uniquely that a composite picture is evolved for ready application to medicine and dentistry.

The work is divided into several parts: metabolic disorders; cardiovascular; respiratory; digestive; hemopoietic; endocrine; locomotor; immunity and excretory systems. It is well written, clearly portrays the subject matter, is carefully documented and well illustrated. Emphasis throughout is on fundamental principles presented for each phase of medical and dental practice.

I. Newton Kugelmass

THE HISTORY OF DENTISTRY IN ARKANSAS

Compiled by Fred W. Dietrich, D.D.S. 397 pages with 214 photographs. Index. Price $10. Camden, Ark., Hurley Co., Inc., 1957.

Dental pioneers were not lacking in early Arkansas. They came from the north, east and south. Among them was Hammond Peletiah Marshall, a dentist and church minister. Between his birth in Maine (1816) and his death in Georgia (1874) he lived in Pennsylvania, Arkansas and Tennessee, where it is said he made sabers for the Confederacy and invented the metallic casket. There were many Marshalls in Arkansas, also dentists, after him.

Another was Turner Milam, a Confederate veteran from Tennessee and a stickler for rest periods. He would knock off at noon for lunch and nap while the patient, rubber-dammed and open-mouthed, drooled, fidgeted and waited for the good doctor's return.

Still another was J. H. Smith who came to Little Rock after the famous Chicago fire. A leading dentist and negro, he served as an elector for President James Garfield and as a commissioner for a world's fair at New Orleans. He is said to have invented a peach stoner and a weatherboard gauge.

In time the pioneers founded the state dental society and helped enact a state dental law with provisions for a state dental board—all in 1887. The story begins about 1830, when the itinerant Kilgore advertised in the *Arkansas Gazette* that he would be in Little Rock for a few days. It ends with the election of William R. Alstadt, also of Little Rock, as president-elect of the American Dental Association in late 1956.

The book contains biographical sketches of the state society presidents, minutes of early meetings, and a list of all dentists who were licensed in Arkansas since 1887. It has a chapter on the development of public health dentistry in the state.

A contribution to the provincial history of dentistry in America, this volume is of particular interest to Arkansas and the neighboring states.

E. S. Khalifah

A MANUAL OF STOMATOLOGY

By J. P. Walsh, M.D.S., D.D.Sc. First edition. 127 pages with 37 illustrations. Index. Price: 30 shillings. Christchurch, New Zealand, N. M. Peryer, 1957.

This small book is designed to provide for medical students and practitioners a synopsis of the wide range of subjects, such as oral anatomy, diagnosis, dental medicine, tooth extraction and preventive dentistry, which are the "mutual concern of medicine and dentistry." The author suggests also that it might give the dentist "that kind of new perspective which air travel over familiar territory reveals." Bearing in mind the stringent limitation of space devoted to each subject, these purposes have been achieved remarkably well. The organization is logical and the text readable. Photographs and line drawings will help the medical reader understand dental anatomy and pathology and may in some instances refresh the

dentist's knowledge. Many brief case histories are used to emphasize the author's ideas but references are not provided. The chapter on the oral aspects of personality will have most interest for dentists.

The book should provide easy and useful reading for physicians, and dentists might do them a good turn by placing it in their hands.

Basil G. Bibby

PRINCIPLES OF MICROBIOLOGY

By Charles F. Carter, M.D., and Alice Lorraine Smith, M.D. Third edition. 665 pages with 188 illustrations. Index and glossary. $5. St. Louis, C. V. Mosby Co., 1957.

The 33 chapters of this book are simply written and abundantly illustrated. In this third edition the authors have endeavored to bring this book up-to-date by the omission of outdated material and the addition of recent facts.

It is difficult to ascertain for what audience the authors intended this material. The preface to the first edition states that the book is written as a supplement to the "interested student" and "not to make any improvement on the excellent texts already in print," yet one would assume that even the beginning student on the college level would have the information presented in this text readily at his disposal.

The illustrations, although numerous, are not particularly instructive to a student of microbiology. Unlike many books of bacteriology, this volume discusses nonmedical fields of microbiology although it fails to stress their relative importance, especially so in the laboratory exercises which are included at the end of each chapter.

E. G. Hampp

BOOKS RECEIVED BUT NOT REVIEWED

THE RIO GRANDE FLOOD: A COMPARATIVE STUDY OF BORDER COMMUNITIES IN DISASTER • By Roy A. Clifford. Disaster Study No. 7, Committee on Disaster Studies, Division of Anthropology and Psychology, National Academy of Sciences, National Research Council, Publication No. 458. 145 pages with illustrations. $2.50. National Academy of Sciences, National Research Council, 2101 Constitution Ave., Washington, D.C., 1956.

ENCYCLOPAEDIA BRITANNICA, 1957 • Edited by Walter Yust. 23,142 pages with illustrations. Encyclopaedia Britannica, Inc., 425 N. Michigan Ave., Chicago 11, 1957.

CONVERGENCE BEHAVIOR IN DISASTERS: A PROBLEM IN SOCIAL CONTROL • By Charles E. Fritz and J. H. Mathewson. Disaster Study No. 9, Committee on Disaster Studies, Division of Anthropology and Psychology, National Academy of Sciences, National Research Council Publication No. 476. 102 pages with illustrations. $2. National Academy of Sciences, National Research Council, 2101 Constitution Ave., Washington, D.C., 1957.

SURGEONS ALL • By Harvey Graham, M.D. 459 pages with illustrations. $10. Philosophical Library, Inc., 15 E. 40th St., New York 16, 1957.

YOU CAN STOP WORRYING: A PRACTICAL METHOD FOR QUIETING THE MIND • By Samuel W. Gutwirth. 114 pages with illustrations. $3. Henry Regnery Company, 64 E. Jackson Blvd., Chicago 4, 1957.

AN INTRODUCTION TO METHODOLOGICAL PROBLEMS OF FIELD STUDIES IN DISASTERS • By Lewis M. Killian. Disaster Study No. 8, Committee on Disaster, Division of Anthropology and Psychology, National Academy of Sciences, National Research Council Publication No. 465. 35 pages. 75c. National Academy of Sciences, National Research Council, 2101 Constitution Avenue, Washington, D.C., 1956.

MEPROBAMATE AND OTHER AGENTS USED IN MENTAL DISTURBANCES • Edited by Otto V. St. Whitelock. Annals of the New York Academy of Sciences, Volume 67, Article 10, pages 571-894 with illustrations. New York Academy of Sciences, 2 E. 63rd St., New York 21, 1957.

SYMPOSIUM ÜBER FLUORPROBLEME I. FLUOROSE BEIM TIER. II. CARIESPROPHYLAXE MIT FLUOR • By Schweizerischen Akademie der Medizinischen Wissenschaften, Oct. 27, 1956 in Neuenburg. Pages 397 to 549 with illustrations. Sw. Fr. 8. Benno Schwabe & Co., Basel, Switzerland, 1957.

BREVITY IS THE SOUL! • By Selectee Seth William Shields. 141 pages. $2.75. Graessle Mercer Co., Seymour, Ind., 1955.

Current Literature

A CONTRIBUTION TO THE ETIOLOGY AND PATHOLOGY OF DENTAL CARIES

Driak, F. Internat. D. J. 6:537 Dec. 1956.

The relationship of nutrition to dental caries has been discussed in 300 articles that have been published in European journals during the past five years.

The incidence of caries has increased with the growth of civilization. Caries was not present in the specimens from the early stone age, but during the late stone age, the Neolithium, 6,000 to 2,000 B.C., when people settled down to agriculture and cattle breeding, caries became prevalent. A rapid increase in incidence has been observed in times of high standards of civilization such as during the Roman Empire, at the end of the Middle Ages, and in the nineteenth and twentieth centuries.

The proportion of solid to liquid food in diet plays a fundamental role in the development of caries. Other environmental factors that may be related to the prevalence of caries in a certain area are geographical, geological, sociological and economic conditions. The main contributions of the exogenous etiologic factors are nutritional in origin. The mechanical factors, such as the physical effect of foodstuffs on the dentition, also belong to the exogenous factors. Refined food has been responsible for the increase in incidence of dental caries, especially in the decay of incisors, which now make up 30 per cent of all carious teeth. Carbohydrates taken in liquid form cause less caries than those in a solid or sticky form. Maltose and natural starch are more easily oxidized than glucose, sucrose and raffinose.

Stimulated saliva has a stronger buffering capacity, contains less bacteria and has more constant pH and redox values than unstimulated saliva. Although the sulphocyanate content of the saliva has little bearing on its bacteriostatic or bactericidal properties, the amount of mucinase and hyaluronidase in saliva does affect the virulence of oral microorganisms.

Experiments with radioactive isotopes have shown that mature enamel has a very slight and slow metabolism. Therefore, enamel is a substance in which demineralization and remineralization take place. In order to prevent rickets and enamel hypoplasia, correct diet intake by the expectant mother should begin in the seventh week of pregnancy. The best food for the infant in the first six months is mother's milk since it contains all the vitamins and other essential factors for growth. The child's diet should be varied later, but an excessive amount of proteins should be avoided since it leads to hyperacidity and may cause diseases of the tooth and the gingiva.

The development of caries in certain teeth may be associated with damage caused by deficiencies of trace elements, such as fluorine, and by insufficient amounts of certain vitamins, such as pantothenic acid. A "building-up" factor which has caries preventive properties has been found in the adherent brown-black tartar of certain young persons. The general deterioration of the human constitution and the integration of races may be contributing factors toward the present world-wide prevalence of dental caries.

Eugene R. Zimmermann

THE HOSPITAL CLEFT PALATE CENTER: SURGICAL PROBLEMS AND PROCEDURES

Leo Stern, Jr., and Stanley L. Lane. N. Y. State D. J. 23:245 June-July 1957.

The Cleft Palate Center of the Mount Sinai Hospital was established through the initiative of dentists as an integrated service for the care of patients with cleft lip and palate. A number of cooperating specialists work together with the ultimate goal of rehabilitating the patient. This concern by a group minimizes attention to a single physical defect, and emphasizes the importance of assisting the patient to become a normal member of society.

Emphasis is placed on the psychological problems which confront the cleft palate child, and the role of the psychiatrist is stressed in the treatment plan. Group consultation affords an opportunity for expression of diverse points of view and restrains each specialist from overzealously plying his mode of therapy.

In a group set-up, great emphasis is placed on the child's speech and the role of the speech therapist. The surgeon and prosthodontist are given an opportunity to work in close harmony. In the final analysis, speech proficiency and psychic health are the critical considerations and may outweigh preferences for surgery or prosthesis, or for early or late repair.

Surgery is mentioned as the preferred mode of treatment. For the usual cleft palate of reasonable length, the modified von Langen-

beck method of closure remains the procedure of choice. The Wardill and Dorrance push-back operations are utilized either as first or second stage procedures on slightly shorter palates. Vomer and pharyngeal flaps are the other most commonly used methods of surgical repair.

Bruce L. Douglas

PLANNING SURVEYS TO ASSESS A STATE'S ORAL HEALTH STATUS

D. F. Striffler. Pub. Health Rep. 72:295 April 1957.

The public health dentist diagnoses the state for its oral health needs much as a private practitioner diagnoses his individual patients. Surveys are the methods generally used to make such assessments. Eight types of interrelated surveys are desirable to assess the oral health of the state and its people. Emergency problems do arise to interfere with the routine of a planned schedule.

A brief outline of the eight types of surveys and some limited observations are as follows:

1. Subjective impressions are difficult to record and analyze, but may prove to be valuable information. A written questionnaire or check list, as well as workshops and personal interviews, can be used to obtain certain types of information.

2. A survey of knowledge, attitudes and practices can be combined with subjective impression.

3. A survey already completed by another organization for another purpose may contribute to desired observations.

4. A survey of the characteristics of a state may bring out such factors as income, social attitudes, educational standards, political, and religious characteristics.

5. In an assessment of oral diseases, the most prevalent should be surveyed; these include dental caries, periodontal diseases, malocclusion, congenital defects, cancer and other diseases and hazards.

6. When oral health problems have been determined, dental resources should be considered, including dentists and auxiliaries, public and private treatment facilities, training facilities, and laboratories.

7. Auxiliary personnel who are not strictly dental often engage in projects relating to dental health.

8. Psychological, educational, professional, economic, social, geographic and administrative blocks will be largely surveyed if the other seven surveys are made, although some blocks may be surveyed directly with the aid of a social scientist. Special problems may need research investigation during the course of evaluating the statistics of the state's oral health. Existing source material may help answer many of these questions.

Difficulties involved in making complete surveys to assess a state's oral health status may appear insurmountable, but state dental personnel may do the job gradually with the help of others. However, the job will never be complete because of inevitable changes; therefore, it should be a continuous program.

John E. Christzberg

CHELATION IN ROOT CANAL THERAPY

B. Nygaard Östby. Odont. Tskr. 65:3 Feb. 1957.

A chelating compound, ethylenediamine tetraacetic acid solution (EDTA) is proposed as an adjuvant in root canal therapy. Demineralization of hard tissue can be accomplished by organic chelating agents at neutral pH.

EDTA has a certain amount of dentin dissolving effect desirable in all kinds of root canal therapy, but is especially useful in narrow or obstructed canals. It has been possible to go beyond fractured instruments in the canal in a short time by means of this solution. EDTA will demineralize a limited zone of dentin surrounding the root canal when used during reaming or when deposited in the canal.

The compound has shown no deleterious effect on pulpal or periapical tissues under experimental conditions. It is neutral to the gingivae and the mucous membrane and has no corroding effect on instruments.

Because of favorable results obtained in practical cases and in experimental investigations, a solution of ethylenediamine tetraacetic acid is recommended as a replacement for the caustic inorganic acids in root canal therapy.

Frank B. Trice

A CLASSIFICATION OF CLASS II, DIVISION 1 MALOCCLUSION

R. G. Henry. Angle Orthodont. 27:83 April 1957.

An attempt has been made to correlate intraoral and extraoral observations of a large number of patients with Class II, Division 1 malocclusion.

The four Class II, Division 1 malocclusion classifications are: (1) maxillary alveolar pro-

trusion; (2) maxillary basal protrusion; (3) micro mandible and (4) mandibular retrusion.

There is no sharp line of demarcation and, because of superimposition of environmental factors or hereditary influences, some patients may reveal characteristics of two types. Discrepancy between tooth size and basal bone may be found in some of these patients, but this does not alter the classification.

The angulation of the upper cuspid to the occlusal plane is some indication of the mesial movement of the particular buccal segment. It cannot be claimed, however, that it is by itself a general indication of forward movement of the upper arch.

In the 103 Class II, Division 1 malocclusions studied, the mean position of the upper first permanent molar was distal in relation to cranial anatomy and in a similar mesiodistal position within the maxilla when compared with normal.

The use of lateral head roentgenograms as an adjunct to dental plaster casts, case histories and patient examination in classification has been illustrated.

William F. Ford

TAKING A SECOND LOOK AT HEAD CAP TREATMENT

Donald Ketterhagen. Angle Orthodont. 27:93 April 1957.

In recent years, the head cap, with refinements, has enjoyed renewed popularity. By definition, head cap means any apparatus utilizing the back of the head or neck for anchorage.

From January 1948 to January 1955, 557 patients had received head cap treatment—some of these wore head caps only, others head caps in combination with full appliances, still others wore head caps for retention. A small percentage wore a combination of all three.

Indications for head cap treatment only are:

1. Severe Class II patients who suffer a gross discrepancy in the bony facial pattern. Treatments are started when the first molars erupt. A second period of full appliance therapy is equally basic in an adequate plan for correction.

2. Those patients who have an excellent chance of obtaining satisfactory results with no further treatment. These patients also are started as soon as the first molars erupt, if possible.

3. Those patients who, after completion of treatment, exhibit a tendency for return to an overjet, or for whom the proper mesiodistal relationship has not been attained or cannot be maintained. These patients often are aided by use of a head cap for retention.

Head cap in combination with full appliance treatment is indicated for:

1. Any Class II patient whose mandibular arch is not considered to be adequately anchored.

2. Borderline extraction patients. Head cap treatment often can prevent loss of bicuspids. The head cap is placed on the first molars about one year before the time full appliances will be indicated. For dental purposes, this would be at the age of about 10 or 11. Often the response to treatment is such that a plan of extraction can be changed to one of nonextraction, and very little remains to be accomplished with the full appliance.

William F. Ford

DETERMINATION OF IRON IN DENTAL ENAMEL

Per Torell. Odont. Tskr. 65:20 Feb. 1957.

In order to strengthen a previous conclusion that iron compounds in dental enamel are of physiological significance, iron determinations were performed on the outer enamel layers of intact lower first bicuspids. Two consecutive layers about 0.3 mm. thick were ground away, dried at 98° C. to constant weight, and analyzed separately by the conventional O—phenanthroline method. Samples of the enamel part of the substance in arrested carious lesions were similarly analyzed.

Surface layers of newly erupted teeth contained, on a dry weight basis, 0.020-0.028 per cent iron, whereas deeper layers contained 0.012-0.022 per cent. Corresponding values for teeth that had been erupted for 30 to 40 years were higher (0.042-0.064 per cent and 0.020-0.031 per cent for surface and deeper layers, respectively,) suggesting that iron-bearing drinking water and food may contribute to the gradual iron enrichment of the enamel. The enamel part of the substance from arrested carious lesions contained 0.094-0.128 per cent iron, and it is suggested that these high values may contribute to the high acid resistance which characterizes this type of enamel.

Because of the variation in iron content with age and with different geographical localities, it is impossible to compare the results of iron determinations performed by workers in different areas, and it is doubtful whether normal and physiological iron values for enamel can be established.

Ernest Beerstecher

AN ULTRASONIC METHOD FOR ROOT SCALING: PRELIMINARY REPORT

Paul J. Tascher and Sol J. Ewen. New York D. J. 23:266 June-July 1957.

Ultrasonic apparatus converts high frequency electrical energy into mechanical energy in the form of rapid vibrations. The effect of these vibrations on fluids with nascent gases, and their explosive effect in dislodging calculary deposits from the surface of teeth were investigated. A conventional ultrasonic power generator which delivers vibrational mechanical energy to tool tips was used. Specially designed tool tips, which permitted ease of accessibility to root surfaces, were utilized. The fluids were selected for their effectiveness in preparing cavities. The one found to be most effective was sodium hypochlorite.

The set-up was designed to deliver one drop of fluid per second through a small nozzle attached to the ultrasonic transducer. The calculus was rubbed very gently with slow, regular strokes. No positive pressure was applied to root surfaces with cavitation. Fragmentation and dislodgment of the root surface accretions took place.

Examination of the root surfaces with a magnifying lens revealed a rippled, satinlike surface.

Bruce L. Douglas

OPERATIVE DISPLACEMENT OF A LOWER THIRD MOLAR COMPLICATED BY EMPHYSEMA

John E. Sullivan. O. Surg., O. Med. & O. Path. 10:355 April 1957.

A 20 year old white man was hospitalized as an emergency oral surgery patient after an attempted removal of the lower right third molar. His dentist had tried to section the tooth with a chisel and mallet, which resulted in displacement of the tooth through the lingual cortical bone. During the three-and-one-half mile trip from the dentist's office to the hospital, the patient developed considerable subcutaneous emphysema of the face and neck.

Diagnosis at the hospital disclosed (1) traumatic displacement of the right mandibular third molar into the pterygomandibular region and (2) acute progressive subcutaneous emphysema secondary to the open wound. The tooth then was removed through an extension of the original incision and a lingual flap.

By this time, the emphysema had progressed until it had more than doubled in amount. The airway, however, remained open at all times and there was only moderate edema. Emergency and routine orders were written on the patient's chart.

The case is of special interest because of the simultaneous occurrence of two separate and relatively rare complications of oral surgery—the displacement of the lower third molar into the lingual tissues and the development of a progressive cervical emphysema. An investigation of the circumstances of the original operation revealed the following: (1) no preoperative roentgenogram had been taken; (2) an assistant delivered the mallet blow to section the tooth and (3) violation of surgical principles of exodontia and flap design were evident.

It was evident that insufficient diagnosis had been made. Also, the patient had an upper respiratory infection which caused him to cough and sneeze frequently. These factors helped to develop the progressive emphysema.

Theodore C. Levitas

SYMPTOMS ASSOCIATED WITH THE TEMPOROMANDIBULAR JOINT

L. Laszlo Schwartz and Harold Cobin. O. Surg., O. Med. & O. Path. 10:339 April 1957.

Temporomandibular joint symptoms have received much attention during the last 20 years. In 1934 Costen described a symptom complex which now bears his name. Costen's views gained wide support, but were not universally accepted. His recommended treatment, bite opening, also has met with some disfavor.

In 1955, after a five-year study, the authors suggested that joint pain and dysfunction be established as a separate syndrome. They consider abnormalities of the occlusion to be only a contributing factor.

Tables and charts to substantiate the findings of this study of 491 patients are included. The major conclusions are (1) the temporomandibular joint pain-dysfunction syndrome was found most frequently in females and (2) the syndrome described by Costen was not found.

Theodore C. Levitas

ERYTHEMA MULTIFORME EXUDATIVUM

Burno W. Kwapis. O. Surg., O. Med. & O. Path. 10:363 April 1957.

Nine patients with erythema multiforme exudativum—an uncommon but not rare dermatosis—were observed in a study of this disease.

In current literature the disease is referred

to as minor or major. Minor is used to denote that the patient is afflicted with cutaneous and oromucosal lesions. This usually is common in young adult male patients. There is evidence to support thinking that the disease may be seasonal. The major form is more severe and, in addition to the foregoing symptoms, also shows evidence of ocular and genital involvement. This form of the disease can be fatal.

Exact etiology of the disease is not known, but the histopathology of the development of the vesicular lesions has been established. Therapy is basically symptomatic, and the use of antihistamines to relieve itching is of value. Unless fever is present, use of broad spectrum antibiotics is not indicated. A bland mouth wash is helpful in maintaining oral hygiene. Accurate differential diagnosis is essential.

The typical cutaneous lesion appears as an irislike form with a varied distribution on the surface of the body. The oral lesion arises as a vesicle, the epithelial surface of which soon desquamates, leaving a painful hemorrhagic ulcer. Any portion of the oral and pharyngeal cavity may be involved. Furthermore, the ocular lesions which develop in the major form of the disease are usually in the nature of conjunctivitis, which can lead to permanent loss of vision. The treatment of erythema multiforme exudativum should be the responsibility of a physician.

Theodore C. Levitas

SKULL TONGS IN CRANIOMAXILLARY FIXATION

Gerald H. Bonnette and José L. Garcia-Oller. J. Oral Surg. 15:156 April 1957.

Severe traumatic injuries to the bones of the face and head do not always lend themselves to management by conventional procedures. Associated injuries of adjacent regions frequently dictate the treatment of choice. Bone loss, comminution, necessity of subsequent trephination, and spinal injuries requiring skeletal traction are examples which need consideration. Neurosurgical skull tongs may be utilized for traction and fixation in certain troublesome cases. The advantages of this type of fixation are: (1) ease of application and maintenance; (2) permits access for neurosurgical intervention; (3) may be used in presence of extensive frontal or temporal bone loss and (4) may be used concurrently for skeletal traction in cervical-vertebral injuries.

The use of skull tongs proved to be advantageous in the treatment of one patient when extensive bone loss and necessity for neurosurgical access precluded treatment by the usual procedures. A heavy wire was adapted to the skull tongs and a suspension wire from this through the cheek to the maxillary arch bar served as an adjunct for traction and fixation. The appliance can be modified by the addition of rods, bars, and universal joints to simplify its use in almost any maxillofacial fracture.

Precautions to be observed in the use of this appliance are: (1) the tongs require daily attention and care; (2) a special drill point simplifies the application and (3) tongs should be applied so that skeletal traction is in the plane of the articulating cervical facets.

FRACTURE OF THE EXTERNAL ANGULAR PROCESS OF THE FRONTAL BONE; ITS RELATION TO MAXILLOFACIAL FRACTURES

Irwin A. Small, Donald Simmons and Harvey Gass. J. Oral Surg. 15:271 Oct. 1957.

Skull fractures frequently complicate the surgical procedure in the reconstruction of a maxillofacial fracture. When open reduction and cranial fixation are indicated, the external angular process of the frontal bone is the key to proper reduction and fixation.

When a patient suffers a combination of skull and maxillofacial fractures, the former demands prior consideration with due regard for the safety of the patient. Frequently, a combined procedure may be employed for the solution of both problems.

Two such cases are described. In each instance, the maxillofacial injury is a fracture of the external angular process of the frontal bone. The importance of the preservation of this process and the importance of the fixation of the frontal bone to the skull is emphasized. The external angular process of the frontal bone plays a vital role in the reduction and fixation of zygomatic or zygomaticomaxillary fractures.

THE USE OF ACRYLIC SPLINTS AFTER SURGERY FOR OROANTRAL FISTULAS AND PALATAL TORI

Newton E. Allen. J. Oral Surg. 15:283 Oct. 1957.

Acrylic splints, retained by natural teeth, have been used to aid the healing process after operations for closure of oroantral fistulas and removal of palatal tori. Observation of these

abnormalities in patients without teeth emphasized the need for a method of applying splints to edentulous arches.

After surgical closure of an oroantral fistula, a splint made of self-curing acrylic resin may be sutured into place over the field of operation. It is made by pressing freshly mixed self-curing acrylic resin between a plaster model of the region and a counter-die. Pressure is maintained by using elastic bands until the acrylic resin is cured. The splint is removed and polished. Four holes are drilled through the splint on each side for the reception of sutures. After the operation, the splint is sutured into position by passing the sutures through the holes and attaching them to the unelevated, underlying mucoperiosteum. The splint is allowed to remain in place for 10 to 14 days.

In the absence of facilities for the construction of an acrylic splint, a gauze pad may be substituted and sutured over the field of operation.

After the removal of a palatal torus, the space between the mucoperiosteal flaps and the underlying bone frequently causes a fibrous pad to develop. This space may be eliminated by suturing a gauze pad over the area. The sutures are attached to the unelevated mucoperiosteum on each side of the gauze and tied across it. The gauze is allowed to remain in place approximately seven days. After removal of the gauze, the flaps usually have healed firmly against the underlying bone and deeper layers of the gauze are relatively clean.

ACINIC CELL TUMOR OF THE MAJOR AND MINOR SALIVARY GLANDS

Robert J. Gorlin and Anand Chaudhry. J. Oral Surg. 15:304 Oct. 1957.

A rare neoplasm of the salivary glands, chiefly of the parotid glands, this tumor is slow growing, rounded and well encapsulated, and is said to be more common in women during the fifth and sixth decades. It has a tendency to recur; the recurring neoplasm shows less evidence of encapsulation.

Histogenetically, there is a noticeable similarity between the cells of this neoplasm and those of serous acini of normal salivary glands. Microscopically, various patterns may be seen. The acinic cells may be closely packed together with little stroma or they may be arranged in pseudoacinar or pseudoglandular patterns. The histological characteristics of the lesion may not fit in with the clinical behavior of this tumor. A histologically benign neoplasm may behave as a low grade malignant tumor clinically. The tumor has a tendency to metastasize. Regional metastases to the cervical lymph nodes are not as common as distant metastases. Common sites for distant metastases are the lungs, liver and brain.

The authors have reviewed 17 cases of this neoplasm. Of the 17 instances, 15 occurred in the parotid salivary glands, one in the sublingual gland and one in the minor oral salivary glands. There was no significant sex difference and the most common age range was the fifth to sixth decades. Of the ten patients who were followed from 5 to 20 years, only five were free from the disease. One of the other five had regional metastases to the lymph nodes, whereas four had metastases to distant sites such as skin, lungs, liver and brain.

A VARIATION IN CLEFT PALATE

James R. Hayward and James K. Avery. J. Oral Surg. 15:320 Oct. 1957.

An exact knowledge of the etiology of cleft palate remains unknown. According to most reported studies, the genetic basis for oral clefts has been found to be between 20 and 30 per cent; however, the hereditary influences are not predictable. A variety of environmental factors which increase the incidence of oral clefts in susceptible strains of animals have been studied. Many of these environmental influences have not been satisfactorily correlated to explain the occurrence of oral clefts in humans. At the critical time of fusion of the parts of the lip and palate, there is vulnerability to a variety of influences. It is apparent that the etiology of oral clefts is dependent on both hereditary and environmental influences which are subtle in their manifestations and unpredictable. One cleft palate theory states that the mechanical role of the tongue prevents the approximation of the parts of the cleft palate.

The variation in cleft palate, which is reported in detail, describes an anomalous band of tissue between one margin of a cleft palate and the floor of the mouth. A review of embryology then is cited to explain the phenomenon manifest in the reported case. The case report and the embryology review illustrate the intricate relationships between the development of oral structures and the basis for the anomaly described through the structural proximity of developing parts.

Deaths

Adams, John M., Marengo, Ill.; Northwestern University Dental School, 1908; died August 26; age 71.

Ainey, Albert E., Montrose, Pa.; University of Pennsylvania School of Dentistry, 1906; died August 13; age 74.

Anderson, Wallace E., Willmar, Minn.; University of Minnesota School of Dentistry, 1937; died June 25; age 43.

Anthony, L. Pierce, La Grange, Ill.; Southern Dental College, 1901; died September 2; age 80.

Appelbaum, Jacob J., Brooklyn; died June 11; age 55.

Atchison, George B., Elgin, Ill.; Northwestern University Dental School, 1898; died July 4; age 82.

Baldwin, Stephens L., Atlanta, Ga.; Atlanta-Southern Dental College, 1918; died August 23; age 61.

Banbrock, Walter E., Auburn, Calif.; University of California College of Dentistry, 1924; died September 10; age 57.

Barnicle, Daniel J., Framingham, Mass.; died August 13; age 88.

Barrodale, Barry J., Houma, La.; Loyola University School of Dentistry, 1929; died July 26; age 51.

Barrows, Harrington S., Chardon, Ohio; died September 5; age 87.

Barry, Joseph Merlin, Beaumont, Texas; Texas Dental College, 1926; died August 30; age 55.

Beavers, Wilson F., Meridian, Miss.; Vanderbilt University School of Dentistry, 1905; died July 23; age 74.

Beck, Samuel S., New York; New York College of Dentistry, 1905; died July 14; age 79.

Berry, Samuel, Brookline, Mass.; Harvard Dental School, 1913; died July 16; age 65.

Bibber, William R., Eastport, Maine; University of Maryland Dental Department, 1897; died August 16; age 82.

Bird, Caleb H., Troy, N. Y.; Pennsylvania College of Dental Surgery, 1892; died July 19; age 86.

Blackburn, Wilbur E., Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1898; died July 17; age 80.

Blanchard, Roy, Clermont, Fla.; University of Buffalo School of Dentistry, 1901; died September 23; age 78.

Blutter, Solomon David, Roslyn, N. Y.; New York University College of Dentistry, 1929; died September 30; age 51.

Bolan, Edmund J., Bradford, Mass.; Harvard Dental School, 1917; died July 22; age 60.

Bomke, John J., Muscatine, Iowa; Keokuk Dental College, 1908; died September 14; age 75.

Boyens, Paul J., San Francisco; College of Physicians and Surgeons, 1902; died October 9; age 77.

Bradshaw, Harold F., New London, Conn.; Baltimore College of Dental Surgery, 1918; died September 22; age 73.

Brady, F. J., Denver; Colorado College of Dentistry, 1913; died August 13; age 67.

Bragdon, N. Woodbury, Danvers, Mass.; Tufts College Dental School, 1909; died September 27; age 69.

Bray, Willis J., Chicago; St. Louis University School of Dentistry, 1912; died July 17; age 68.

Brooks, John P., Richwood, Ohio; Ohio Medical University College of Dentistry, 1905; died July 4; age 76.

Brown, Charles B., Parkersburg, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1913; died September 21; age 76.

Bryant, Myron E., Boston, Mass.; Tufts College Dental School, 1911; died August 31; age 67.

Burns, Robert L., Ashland, Ill.; Northwestern University Dental School, 1916; died July 15; age 63.

Carling, George F., Sayre, Pa.; Pennsylvania College of Dental Surgery, 1904; died August 22; age 78.

Carnahan, Chester L., Pawpaw, Ill.; Northwestern University Dental School, 1924; died August 15; age 62.

Cassel, Herman F., University City, Mo.; Washington University School of Dentistry, 1892; died August 17; age 84.

Childs, Vernon S., Tulsa, Okla.; Kansas City-Western Dental College, 1935; died July 17; age 52.

Colquitt, D. M., Waxahachie, Texas; Baylor University College of Dentistry, 1919; died August 19; age 72.

Comroe, Joseph I., Chicago; Pennsylvania College of Dental Surgery, 1903; died August 4; age 75.

Conti, Roy R., Montclair, N. J.; University of Southern California School of Dentistry, 1927; died September 16; age 58.

Corbo, Angelo J., Fort Eustis, Va.; University of Pennsylvania School of Dentistry, 1919; died July 20; age 60.

Cousins, Henry Warde, Lincoln, Neb.; Kansas City Dental College, 1895; died July 14; age 82.

Coutant, Frederick I., Wichita, Kan.; St. Louis University School of Dentistry, 1919; died August 23; age 69.

Cross, Leach, N. Y.; New York College of Dentistry, 1907; died September 7; age 71.

Cuneo, Charles M., Owego, N. Y.; University of Pennsylvania School of Dentistry, 1913; died September 3; age 69.

Davidson, James B., Montclair, N. J.; New York University College of Dentistry, 1907; died October 1; age 70.

del Valle, Pedro G., San Juan, Puerto Rico; University of Michigan School of Dentistry, 1919; died September 25; age 60.

Densmore, John A., South Bend, Ind.; Indiana Dental College, 1921; died August 9; age 61.

Eisler, Jacob, N. Y.; New York College of Dentistry, 1913; died July 5; age 67.

Ellington, Charles S., Cooper, Texas; Louisville College of Dentistry, 1906; died September 10; age 74.

Ellison, Roland A., Ardmore, Pa.; Temple University School of Dentistry, 1927; died July 4; age 54.

Ellsworth, Presley E., Beaufort, S. C.; St. Louis University School of Dentistry, 1916; died August 15; age 63.

Fifield, Hugo H., Pierre, S. D.; Northwestern University Dental School, 1918; died September 6; age 64.

Fischman, Abraham E., Newark, N. J.; Pennsylvania College of Dental Surgery, 1907; died September 15; age 68.

Foster, Leo J., Washington, D. C.; Howard University College of Dentistry, 1914; died August 19; age 71.

Franklin, Sandy T., Knoxville, Tenn.; Howard University College of Dentistry, 1917; died July 19; age 72.

Frantz, Cyrus B., Sacramento, Calif.; Pennsylvania College of Dental Surgery, 1890; died September 10; age 87.

Frawley, Clinton B., Syracuse, N. Y.; University of Pennsylvania School of Dentistry, 1914; died August 7; age 66.

Frederici, Floyd C., Sellersville, Pa.; University of Pennsylvania School of Dentistry, 1898; died July 15; age 83.

Furfey, James A., Boston; Harvard Dental School, 1895; died August 31; age 82.

Gainsforth, Silas P., Ogallala, Neb.; Northwestern University Dental School, 1900; died September 1; age 86.

Gayer, Walter E., West Point, Neb.; Creighton University College of Dentistry, 1925; died August 16; age 56.

Gilbert, Robert S., New York; Tufts College Dental School, 1934; died June 25; age 49.

Gilmore, William M., Denver; Colorado College of Dentistry, 1918; died September 6; age 67.

Gitt, Chester N., Gettysburg, Pa.; University of Pennsylvania School of Dentistry, 1909; died September 8; age 70.

Goodwin, Herbert L., New York; Harvard Dental School, 1932; died August 3; age 54.

Greenstein, Louis, Forest Hills, N. Y.; College of Dental and Oral Surgery, 1915; died June 12.

Gregg, Victor H., Indianapolis; Indiana Dental College, 1921; died August 8; age 66.

Grimm, Paul F., Chicago; Chicago College of Dental Surgery, 1918; died September 17; age 63.

Grodberg, Harold, Bayonne, N. J.; New York College of Dentistry, 1917; died July 23; age 61.

Hahn, M. Arthur, Floral Park, N. Y.; Columbia University School of Dental and Oral Surgery, 1927; died September 4; age 57.

Halpern, Harry, North Hollywood, Calif.; Chicago College of Dental Surgery, 1912; died July 30; age 72.

Halsey, Norman S., San Rafael, Calif.; University of California College of Dentistry, 1898; died August 28; age 83.

Haskell, Clinton R., Utica, N. Y.; Philadelphia Dental College, 1906; died August 13; age 73.

Hawn, Joseph R., Buffalo; University of Buffalo School of Dentistry, 1917; died September 4; age 63.

Hedges, Felix G., Cynthiana, Ky.; Ohio College of Dental Surgery, University of Cincinnati, 1901; died March 25; age 76.

Heidbrink, Jay Alvin, Orlando, Fla.; University of Michigan School of Dentistry, 1901; died August 11; age 82.

Henry, Elmer E., Philadelphia; Medico Chirurgical College of Philadelphia, 1902; died August 31; age 73.

Henson, Frazier L., Mooresville, Ind.; Kansas City-Western Dental College, 1928; died September, 1957; age 55.

Heyboer, Siebert J., Chicago; Northwestern University Dental School, 1932; died August 8; age 54.

Hill, Marcus H., Carbon Hill, Ala.; Birmingham Dental College, 1908; died August 29; age 82.

Hitz, Clarence B., Bellingham, Wash.; North Pacific College of Oregon School of Dentistry, 1925; died September 12; age 58.

Hoffman, Melville G., San Carlos, Calif.; University of California College of Dentistry, 1935; died September 3; age 49.

Hoss, Basil R., Pierre, S. D.; Creighton University College of Dentistry, 1954; died August 29; age 30.

Krause, David D., Bridgeport, Conn.; died July 4; aged 74.

LaRue, Raymond A., Atlantic City, N. J.; Temple University School of Dentistry, Philadelphia, 1909; died June 30.

Littlefield, Otis M., Manchester, N. H.; Tufts College Dental School, Boston, 1917; died July 29; aged 65.

Lopp, Harry E., Louisville, Ky.; University of Louisville School of Dentistry, 1929; died September 13; aged 51.

Lucas, Robert F., South Bend, Ind.; Chicago College of Dental Surgery, 1904; died June 25; aged 75.

Lusthaus, Louis J., Milwaukee; Marquette University Dental School, Milwaukee, 1923; died August 28; aged 62.

MacLoskey, Milon R., North Hollywood, Calif.; University of Southern California School of Dentistry, Los Angeles, 1924; died September 10; aged 62.

Maits, Aage, Chicago; University of Illinois College of Dentistry, Chicago, 1920; died September 1; aged 66.

Mally, Manuel J., Atlantic City, N. J.; University of Pennsylvania School of Dentistry, Philadelphia, 1921; died July 25; aged 61.

McEwen, James L., Wichita, Kan.; Kansas City-Western Dental College, 1924; died August 8; aged 59.

Meshnik, Bernard H., Providence, R. I.; Temple University School of Dentistry, Philadelphia, 1943; died August 14; aged 37.

Miller, James S., Trenton, N. J.; University of Pennsylvania School of Dentistry, Philadelphia, 1905; died July 3; aged 78.

Miller, Melvin A., Eagle River, Wis.; University of Minnesota School of Dentistry, 1917; died April 28; aged 61.

Miner, Walter C., Boston; Harvard Dental School, Boston, 1901; died August 27; aged 80.

Moremen, Charles W., Ocala, Fla.; Southern Dental College, Atlanta, 1915; died August 25; aged 69.

Morton, Alexander, Laurens, Iowa; University of Iowa College of Dentistry, Iowa City, 1909; died June 8; aged 80.

Mullaney, Michael L., Providence, R. I.; Georgetown University School of Dentistry, Washington, D. C., 1919; died August 25; aged 69.

Murray, Robert Leslie, Buffalo; University of Buffalo School of Dentistry, 1921; died July 31; aged 59.

Myers, Alva C., Bethel, Ohio; Ohio State University College of Dentistry, Columbus, 1918; died April 14; aged 60.

Norwood, Samuel R., Simmesport, La.; Vanderbilt University School of Dentistry, Nashville, 1898; died June 24; aged 80.

O'Brien, George E., Pleasantville, N. Y.; University of Pennsylvania School of Dentistry, Philadelphia, 1944; died July 9; aged 37.

O'Neill, George E., West Somerville, Mass.; Tufts College Dental School, Boston, 1923; died July 25.

Otoupalik, Joseph, Greeley, Colo.; University of Denver, School of Dentistry, 1910; died June 6; aged 80.

Phillips, Simon F., St. Louis; Meharry Medical College School of Dentistry, Nashville, 1914; died April 27; aged 71.

Prather, Thomas F., Lancaster, Calif.; College of Physicians and Surgeons, San Francisco, 1925; died September 2.

Putzman, Sigmund D., Boston; St. Vladimir University, 1909; died June 30; aged 72.

Richards, John L., Leucadia, Calif.; University of Iowa, College of Dentistry, Iowa City, 1908; died May 1957; aged 72.

Richardson, Cecil E., Big Spring, Texas; died July 10; aged 67.

Robb, Malcolm, St. Louis; Washington University School of Dentistry, St. Louis, 1894; died June 30; aged 84.

Robbins, Irving G., Hartford, Conn.; Georgetown University School of Dentistry, Washington, D. C., 1930; died August 25; aged 56.

Rosenberg, Isadore W., Chicago; Chicago College of Dental Surgery, Loyola University School of Dentistry, 1925; died August 21; aged 54.

Rowe, Abner T., Bethesda, Md.; Baltimore College of Dental Surgery, University of Maryland, 1945; died July 5; aged 38.

Schellenger, Hugh E., Jackson, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1900; died March 27; aged 81.

Seeman, George F., Nashville, Tenn.; Vanderbilt University School of Dentistry, Nashville, 1916; died July 12; aged 63.

Serum, Melvyn C., Eau Claire, Wis.; Marquette University Dental School, Milwaukee, 1940; died June 17; aged 46.

Sheeks, Roy V., Kiowa, Kan.; Western Dental College, Kansas City, Missouri, 1918; died May 3; aged 61.

Shepherd, Barney A., Morton, Ill.; Washington University School of Dentistry, St. Louis, 1927; died July 22; aged 53.

Sherwood, August A., New London, Conn.; Louisville College of Dentistry, 1906; died July 24; aged 82.

Simmons, Walter B., Greenville, S. C.; Atlanta Dental College, 1905; died May 21; age 73.

Sivula, Einar W., Ishpeming, Mich.; University of Michigan School of Dentistry, 1915; died December 8, 1956; age 65.

Smith, John A., Painesville, Ohio; died June 8; aged 55.

Smith, Leonard A., Springdale, Ark.; St. Louis University School of Dentistry, 1918; died August 2; aged 63.

Smith, Nelson R., Los Angeles; University of Southern California School of Dentistry, 1925; died June 18; age 59.

Speer, Arthur D., Inez, Ky.; died April 25; age 89.

Spinney, Harry L., Morro Bay, Calif.; Chicago College of Dental Surgery, 1910; died September 5.

Stack, Thomas P., Hyde Park, Mass.; Tufts College Dental School, Boston, 1911; died February 10; age 68.

Stafford, Ira H., Cumberland, Md.; Cincinnati College of Dental Surgery, 1905; died June 5; age 80.

Stein, Samuel, Brooklyn; Columbia University School of Dental and Oral Surgery of the Faculty of Medicine, New York, 1925; died July 1; aged 57.

Stephens, Robert B., Cincinnati; Cincinnati College of Dental Surgery, 1923; died May 26; age 57.

Stetzer, John J., Philadelphia; Medico-Chirurgical College of Philadelphia, 1899; died June 7; aged 82.

Stiker, Amos G., Addison, N. Y.; University of Buffalo School of Dentistry, 1905; died June 3; age 72.

Stone, Harvey C., Greenbush, Minn.; University of Minnesota School of Dentistry, 1922; died May 14; age 62.

Stone, Wilhelm F., Chicago; University of Illinois College of Dentistry, 1905; died May 7; age 76.

Strance, Edwin J., Edmonds, Wash.; Philadelphia Dental College, 1905; died August 5; aged 76.

Stuart, Ted P., Phoenix, Ariz.; University of Illinois College of Dentistry, 1931; died June 6; age 50.

Swartz, Howard W., Kankakee, Ill.; Marquette University Dental School, 1924; died June 8; age 57.

Talley, Frank R., Petersburg, Va.; Medical College of Virginia School of Dentistry, 1904; died April 25; age 76.

Taylor, George E., Chicago; Chicago College of Dental Surgery, 1898; died July 16; aged 82.

Taylor, James E., Madisonville, Ky.; University of Tennessee College of Dentistry, 1903; died June 16; age 83.

Terrell, George B., New York; New York College of Dentistry, 1900; died July 22; aged 94.

Thogmorton, Robert J., St. Louis; died May 17; age 62.

Tinkham, George E., Baraboo, Wis.; Marquette University Dental School, 1923; died June 17; age 62.

Traxler, Alexander M., Grand Rapids, Mich.; University of Michigan School of Dentistry, 1903; died June 14; age 75.

Troy, Benjamin, New York; New York College of Dentistry, 1918; died August 4; aged 67.

Tucker, William L., Wilson, N. Y.; University of Buffalo School of Dentistry, 1902; died April 22; age 78.

Underman, Richard K., Akron, Ohio; Ohio State University College of Dentistry, 1938; died June; age 44.

Van Fossan, Loy H., Wichita, Kan.; St. Louis University School of Dentistry, 1921; died June 12; aged 58.

Varipatis, Michael S., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1939; died April 10; age 40.

Wallace, James F., Jersey City; College of Dental and Oral Surgery, New York, 1920; died June 15; age 58.

Ward, Welles W., Rochester, N. Y.; University of Buffalo School of Dentistry, 1919; died February 1; age 65.

Warshall, Harry H., Brooklyn; New York University College of Dentistry, 1928; died July 8; aged 54.

Wasielewski, Leon R., Chicago; Northwestern University Dental School, 1937; died June 17; age 44.

Watson, Francis L., La Salle, Ill.; Chicago College of Dental Surgery, 1924; died June 19; age 60.

Wehe, Charles A., Anthony, Kan.; University of Michigan School of Dentistry, 1896; died May 28; age 85.

Whitehead, Marion S., Macon, Ga.; Atlanta Dental College, 1909; died March 30.

Wiese, Herbert F., Glendale, Calif.; University of Southern California School of Dentistry, Los Angeles, 1923; died August 1; aged 60.

Wilbur, Louis A., South Attleboro, Mass.; Philadelphia Dental College, 1890; died July 17.

Williams, John D., Johnson City, Tenn.; Atlanta Dental College, 1900; died June 8; age 80.

Woltz, James W., Wichita, Kan.; Kansas City Dental College, 1902; died May 30; age 82.

Woodward, Murdock M., Findlay, Ohio; University of Maryland Dental Department, 1901; died June 21; age 77.

Zerdesky, Clement A., New Philadelphia, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1928; died June 3; age 51.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
222 East Superior Street, Chicago 11, Illinois
WHitehall 4-6730

LON W. MORREY, *Editor* JOHN J. HOLLISTER, *Business Manager*

All expressions of opinion and all statements of supposed fact are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. Articles are accepted with the understanding that they have not been published previously and that they are submitted solely to The Journal. The Journal of the American Dental Association is indexed in the Index to Dental Literature, in the Current List of Medical Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

Advertising copy must conform to the official standards established by the American Dental Association. Notice of change of address should be received one month before the change is to be effective. Orders for reprints of Journal articles must be received by the Business Manager's office not later than the 15th of the month of issue in order to secure advantage of the lowest possible prices. Orders received after this date are subject to special quotation.

Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York
One-Hundred and First Annual Session	Oct. 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	Oct. 16-19, 1961	Philadelphia

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 24-26	Montgomery	C. R. Crook]	Professional Center, Montgomery
Alaska	June 3-6	Palmer	C. L. Polley	Box 1896, Juneau
Arizona	Apr. 16-19	Tucson	W. G. Burke	15 E. Monroe St., Phoenix
Arkansas	Apr. 13-16	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 20-23	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 14-16	Los Angeles	S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 5-8	Colorado Springs	G. H. Jackson	724 Republic Bldg., Denver
Connecticut	May 14, 15	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			A. G. Schiek	3716 Philadelphia Pike, Claymont
District of Columbia	Mar. 9-12	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 18-21	Miami Beach	G. J. Perdigon	17 Davis Blvd., Tampa
Georgia	Oct. 12-15	Atlanta	J. W. Yarbrough	Southern United Bldg., Macon
Hawaii	June 15-19	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	June 16-18	McCall	G. L. Williamson	100 3½ Main St. Boise
Illinois	May 11-14	Springfield	P. W. Clopper	632 Jefferson Bldg., Peoria
Indiana	May 19-21	Indianapolis	W. R. Shoemaker	Citizens Bank Bldg., Anderson
Iowa	May 5-7	Des Moines	H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	May 5-8	Kansas City, Mo.	F. A. Richmond	Brotherhood Bldg., Kansas City 1
Kentucky	Mar. 23-26	Louisville	A. B. Coxwell, Jr.	2208 Dundee Rd., Louisville 5
Louisiana	Apr. 9-12	Monroe	J. S. Bernhard	2515 Line Ave., Shreveport
Maine			S. M. Gower	Box 27, Skowhegan
Maryland	May 4-7	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 4-7	Boston	H. E. Tingley	12 Bay State Rd., Boston 15
Michigan	Apr. 28-30	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 14-16	St. Paul	C. V. E. Cassel	2236 Marshall Ave., St. Paul 4
Mississippi	June 9-11	Biloxi	B. A. Cohen	500-E E. Woodrow Wilson Dr., Jackson 27
Missouri	May 4-8	Kansas City	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana	May 1-3	Butte	R. C. Ritter	28 N. Black St., Bozeman
Nebraska	Apr. 28-30	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	June 21-25	Lake Tahoe	O. M. Seifert	755 Ryland Ave., Reno
New Hampshire	June 22-24	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 18-21	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 25-28	Las Cruces	J. S. Ellar	7 Medical Arts Sq., N.E., Albuquerque
New York	May 12-14	Buffalo	C. A. Wilkie	1 Hanson Pl., Brooklyn 17
North Carolina	May 4-7	Pinehurst	L. H. Butler	Jefferson Bldg., Greensboro

State	Date	Place	Secretary	Address
North Dakota	May 4-7	Bismarck	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Sept. 28-Oct. 1	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23	Oklahoma City	L. D. Wright	Osler Bldg., Oklahoma City
Oregon	Mar. 3-5	Portland	T. D. Holder	Selling Bldg., Portland
Panama Canal Zone	Apr.	Ancon	W. R. Bond, Jr.	U.S.A., Ft. Kobbe Dental Clinic, Ft. Kobbe
Pennsylvania	May 21-23	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	January		R. Borges	Box 843, Arecibo
Rhode Island	Jan. 28, 29	Providence	W. F. Decesare	216 Broadway, Providence
South Carolina	May 25-27	Myrtle Beach	J. E. Wallace	1506 Gregg St., Columbia
South Dakota	May 11-13	Mitchell	R. E. Decker	Box 308, Parker
Tennessee	May 12-15	Chattanooga	K. P. Ezell	116 N. Academy, Murfreesboro
Texas	May 3-6, 1959	San Antonio		3707 Gaston Ave., Dallas 10
Utah	May 22-24	Salt Lake City	R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont	May 25-27	Manchester	E. H. Van Santvoord	22 Washington St., Rutland
Virginia	May 4-7	Richmond	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	Mar. 24-26	Seattle	W. P. Brust	Medical Center, Everett
West Virginia	July 20-23	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 21-23	Milwaukee	H. O. Hoppe	1331 W. Vliet St., Milwaukee
Wyoming	June 12-14	Casper	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 8-13* June 9, 10†	Birmingham	W. L. McCarty	Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas	June 16-20	Little Rock	W. T. Jones	107 E. Shelton, Monticello
California			D. R. Grant	507 Polk St., San Francisco
Colorado	June 22-28	Denver	R. F. Gilmore	Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia	Jan. 6-10	Washington	W. T. Birthright	1835 Eye St., N.W., Washington
Florida			R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville 3
Georgia	June 9-11	Atlanta	W. G. Brown	Blackshear
Hawaii	Feb. 19-23‡		J. Y. Ing	James Campbell Bldg., Honolulu
Idaho	June 23-25	Boise	A. G. DeWinter	Sun Bldg., Boise
Illinois			W. A. McKee	Wood Bldg., Benton
Indiana			C. A. Frech	Gary National Bank Bldg. Gary
Iowa	June 2-6*†	Iowa City	P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky	June 9-12*†	Louisville	J. J. Kelly	102 W. Madison St., Franklin
Louisiana	June 2-7	New Orleans	R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland	June 9-11‡		W. D. Burton	829 Park Ave., Baltimore 1
Massachusetts			A. M. Bommer	349 Broadway, Revere
Michigan	Jan. 19-25 June 8-14	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit 21
Minnesota			M. G. Walls	Lowry Bldg., St. Paul
Mississippi	Jan. 6-8*†‡		A. H. Richter, Jr.	Aven Bldg., Greenwood
Missouri	June 9-11, 16, 17* June 12-14, 16, 17*	Kansas City St. Louis	R. R. Rhoades	Central Trust Bldg., Jefferson City
	Jan. 27-29†	Kansas City		
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska			H. E. Weber	Stuart Bldg., Lincoln
Nevada			A. A. Cozzalio	130 N. Virginia, Reno

State	Date	Place	Secretary	Address
New Hampshire	June 19, 20* June 19†	Boston	S. G. Markos	8 Renaud Ave., Dover
New Jersey	June 5, 6* June 9, 10* June 13, 14* June 18† June 23, 24*	New York Philadelphia Trenton Teaneck Philadelphia	C. J. Schweikhardt	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York	February 3-5†‡ June 19, 24, 25†‡ June 19, 20, 24-27*‡ Dec. 2-5, 8, 9*‡		D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota	July 7-11	Fargo	G. F. Wirtz	Clinic Bldg., Mandan
Ohio			D. E. Bowers	322 E. State St., Columbus 15
Oklahoma	June 23-25* June 23, 25†	Oklahoma City	W. H. Stephens	Plaza Court Bldg., Oklahoma City
Oregon			F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania	May 26-28*† June 5-7*† June 16, 17*† June 18-20*†	Pittsburgh Philadelphia Philadelphia and Pittsburgh Philadelphia	R. E. V. Miller, Sr.	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Comercio St. #452, San Juan
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			W. J. Brockington	1508 Washington St., Columbia 1
South Dakota			H. T. Aker	Canton
Tennessee			C. R. Alta	Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber	Capital National Bank Bldg., Austin 16
Utah	June 23-28‡		M. T. Rigby	47 E. Center St., Midvale
Vermont	June 23-25*†	Burlington	P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			F. S. Rotchford	1108 S. Washington St., Olympia
West Virginia	June 23-25	West Liberty	C. C. Cottrill	Box 111, Glen Rogers
Wisconsin			S. F. Donovan	Tomah
Wyoming	June 23-25*†‡		E. E. Edwards	Bank of Commerce Bldg., Sheridan

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Dentistry for the Handicapped	Feb. 2	Chicago	M. L. Bramer Secy.	3405 W. North Ave., Chicago
Academy of Denture Prosthetics	May 5-9	Detroit	W. L. Warburton Secy.	Medical Arts Bldg., Salt Lake City 11
Academy of General Dentistry	Feb. 3	Chicago	A. L. Knab Secy.	8500 Stony Island Ave., Chicago 17
All India Dental Conference (Thirteenth)	Feb.	Poona	J. B. Jagos Org. Secy.	2, Mahatma Gandhi Rd., Poona 1, India
American Academy of Crown and Bridge Prosthodontics	Feb. 1-2	Chicago	C. E. Brooks Secy.	4500 Olive St., St. Louis 8
American Academy of Dental Practice Administration	Jan. 30, 31	Chicago	R. H. Campbell Secy.	18595 Grand River, Detroit 23
American Academy of Maxillofacial Prosthetics	Jan. 30, 31	Chicago	H. C. Sullivan Secy.	1516 Wealthy St., S.E., Grand Rapids 6, Mich.
American Academy of Occlusodontia	Feb. 1	Chicago	C. A. Stanley Secy.	7001 N. Clark St., Chicago
American Academy of Oral Pathology	Mar. 30, 31	Washington, D.C.	J. L. Bernier Secy.	Armed Forces Institute of Pathology, Washington 25, D.C.
American Academy of Restorative Dentistry	Feb. 1, 2	Chicago	A. G. James Secy.	409 N. Camden Dr., Beverly Hills, Calif.
American Association for Cleft Palate Rehabilitation	Apr. 24-26	San Francisco	D. C. Spriestersbach Secy.	Dept. of Otolaryngology, University Hospitals, Iowa City
American Association of Dental Schools	Mar. 23-26	Detroit	M. W. McCrea Secy.	University of Minnesota, School of Dentistry, Minneapolis 14

Name	Date	Place	Secy. or Chm.	Address
American Association of Endodontists	Jan. 31-Feb. 2	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago 29
American Association of Industrial Dentists	Apr. 21-23	Atlantic City, N. J.	E. R. Aston Secy.	Pennsylvania Dept. of Health, P.O. Box 90, Harrisburg, Pa.
American Association of Orthodontists	Apr. 27-May 1	New York	E. E. Shepard Secy.	8230 Forsyth Blvd., St. Louis 24
American Board of Oral Surgery	Apr. 5-8	Chicago	L. M. FitzGerald Secy.	Roshek Bldg., Dubuque, Iowa
American Board of Pedodontics	July 29-31	Indianapolis	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln 8, Neb.
American Denture Society	Jan. 31, Feb. 1	Chicago	V. L. Steffel Secy.	College of Dentistry, Ohio State University, Columbus, Ohio
American Equilibration Society	Jan. 30	Chicago	W. W. Hurst Secy.	820 S. Damen Ave., Chicago 12
Asian Dental Congress (Second) and Asian-Pacific Dental Conference	Mar 24-30	Manila, Philippines	B. B. Erana Pres. Elect	P. O. Box 373, Manila, Philippines
British Columbia Dental Association	May 1-3	Vancouver	I. U. MacIntosh Secy.	624 Sixth St., New Westminster, B.C., Canada
Chicago Dental Society	Feb. 2-5	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati Dental Society	Mar. 23-25	Cincinnati	H. F. Lee Chm.	3180 Harrison Ave., Cincinnati 11
Cleveland Dental Society	Apr. 28-30	Cleveland	G. A. Blizil Exec. Secy.	1220 Huron Rd., Cleveland 15
Council on Dental Education, Dental Aptitude Tests	Jan. 10, 11 Apr. 25, 26		S. Peterson Secy.	222 E. Superior St., Chicago 11
Dallas Mid-Winter Dental Clinic	Jan. 26-29	Dallas	W. W. Sherrill Exec. Secy.	2609 Cedar Springs, Dallas, Texas
Denver Dental Association	Jan. 5-8	Denver	E. T. Klein Secy.	Republic Bldg., Denver 2
Endodontics, Second International Conference	June 22-28	Philadelphia	M. Kolb Secy.	4001 Spruce St., Philadelphia 4
European Organization for Research on Fluorine and Dental Caries Prevention, Fifth Congress	May 30-June 1	Brussels, Belgium	A. Syrrist Secy. Gen.	Ecole Dentaire Royale, Malmo, Sweden
Federation Dentaire Internationale, 46th Annual Meeting	Aug. 27-Sept. 2	Brussels, Belgium	G. H. Leatherman Secy.	35 Devonshire Pl., London W. 1, England
Greater Philadelphia Annual Meeting	Mar. 25-28	Philadelphia	M. Kohn Exec. Secy.	Sheraton Hotel, 17th St. and Pennsylvania Blvd., Philadelphia 3
International Association for Dental Research	Mar. 20-23	Detroit	D. Y. Burrill Secy.	311 E. Chicago Ave., Chicago 11
Montana, Ninth District Dental Society	Jan. 16-18	Billings	C. H. Betzer Secy.	1231 N. 29th St., Billings, Mont.
National Board of Dental Examiners	Mar. 31-Apr. 1		G. J. Casey Secy.	222 E. Superior St., Chicago 11
Northeastern Society of Orthodontists	Apr. 29	New York	D. Mossberg Secy.	36 Central Park S., New York
Northwest Academy of Dental Medicine	Apr. 22-26	Victoria, B.C., Canada	G. Underwood Secy.	Selling Bldg., Portland, Ore.
Southeastern Academy of Prosthodontics	Mar. 15, 16	Atlanta, Ga.	H. C. Parker Secy.	Liberty Life Bldg., Charlotte 2, N.C.
Southeastern Society of Oral Surgeons	May 2, 3	Daytona Beach, Fla.	P. B. Whittington, Jr. Secy.	Medical Arts Bldg., Greensboro, N.C.
Southern Academy of Periodontology	Mar. 30-Apr. 1	New Orleans	J. R. Owings Secy.	7 Medical Court, Greenville, S.C.
Thomas P. Hinman Dental Clinic	Mar. 16-19	Atlanta, Ga.	H. Wallace Secy.	1415 The By Way, N.E., Atlanta, Ga.

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CLASSIFIED ADVERTISING

Forms close on 20th of second month preceding month of issue

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Replies to A.D.A. box number ads should be addressed as follows:
American Dental Association
222 E. Superior Street
Chicago 11, Ill. Box.....
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PRACTICES AND OFFICES FOR SALE AND/OR RENT

CALIFORNIA—San Francisco Bay area. For lease reasonable. The only five room dental suite in new medical-dental building in shopping center. Write to Dr. H. Pepper, 50 Edgewood Rd., Redwood City, Calif.

•

CALIFORNIA — Orthodontist — design your own suite in dental building to be constructed in suburban Los Angeles. Building will feature garden suites, air conditioning and free off-street parking for doctor and patients. No orthodontist within five miles. Address A.D.A. Box No. 700.

•

CONNECTICUT — For sale. Three-chair modern, general practice dental office in air-conditioned building. $15,000, terms. Dentist age 47, will stay with buyer for six months and share expenses, refer patients and then retire to Florida. Address A.D.A. Box No. 534.

•

KENTUCKY—New, air-conditioned, shopping center dental office; 1¼ miles from Louisville's largest industry; 550 square feet. Rapidly growing neighborhood. Present dentist going into group practice and wishes to sell all furnishings and equipment. Address A.D.A. Box No. 823.

•

LOUISIANA—Lake Charles—For sale or lease. Two operating room office, modern equipment; established practice. Office adjoining medical clinic. Excellent opportunity in growing city of 60,000. Contact Dr. O'Connor. 115 S. Ryan St., Lake Charles, La.

•

MAINE—Dental office, modern, fully equipped, two operating rooms, laboratory, reception room on ground floor in business building. Always busy practice. Low rental. Priced very reasonably because of illness. Dr. James H. Cunningham, 35 Cottage St., Bar Harbor, Me.

•

MARYLAND—For sale. Chevy Chase, 4701 Bradley Blvd. Fully equipped modern office with all new Ritter equipment, including x-ray and motor-driven chair. Anyone desiring information, please call Emerson 3-0822 between 7:30 p.m. and 9:00 p.m., or write Dr. Abraham Friedman at 5168 Linnean Terrace, N.W., Washington, D. C.

•

MARYLAND — Young practitioner, gross over $30,000 wishes to sell practice $3,000; terms available; small town. Address A.D.A. Box No. 784.

•

MICHIGAN—For sale. Northwestern section, lower peninsula. Attractive brick and stone modern one-story dental building at present occupied by physician. Room for combined offices or living quarters. Excellent opportunity, terms. Address A.D.A. Box No. 822.

•

NEW JERSEY—Monmouth County—young dentist wanted to rent active practice with full equipment. Option of buying at reasonable figure. Excellent opportunity for right person. Must act immediately. Address A.D.A. Box No. 789.

•

NEW JERSEY—Vailsburg, Sanford Ave., two-chair dental suite in new air-conditioned two physician medical office now under construction by general practitioner. Call Es. 3-3456.

•

NEW YORK—Dental office and home plus income apartment for sale. Established 25 years; reasonable price; low maintenance; good investment; inspection invited. Dr. Maxwell Finkel, 860 Crane St., Franklin 4-7065, Schenectady 3, N. Y.

•

WASHINGTON—For sale two-chair office; professional building; reasonable rent; excellent Ritter equipment. Long established dental practice; eastern Washington—area 70,000; sell at equipment value. Can net $12,000. Dentist specializing. Address A.D.A. Box No. 824.

•

WISCONSIN—For sale. Active practice in small Wisconsin town with large surrounding area. Pleasant home and two-chair office combination. No other dentist. Former dentist deceased. Address A.D.A. Box No. 825.

•

WISCONSIN—Available. Attractive dental office having operating room, laboratory and waiting room. Modern office building, Green Bay, Wis. Practice well established for over 20 years.

OPPORTUNITIES AVAILABLE

CALIFORNIA—Associate wanted (with or without equipment). Almost all adult dentistry. Located in a choice southern town your wife would love to live in. Write giving full qualifications and references in first letter. Address A.D.A. Box No. 793.

•

FLORIDA—Position open. Four-chair, modern air-conditioned office. Neighborhood practice; permanent association or partnership possible. Pleasant surroundings. Guarantee and percentage. Dr. J. Shuker, 12297 N. W. 7th Ave., Miami 50, Fla.

•

FLORIDA—Wanted, associate for general dentistry in modern, completely equipped clinic, four chairs. High percentage and minimum guarantee if desired. Opportunity to establish own practice without initial outlay. Replies confidential. P. O. Box 1995, Miami 11, Fla.

FLORIDA—Oral surgeon in Tampa Bay area wants young man with accredited training in oral surgery. Offers partnership to right person. Give pertinent personal history qualifications. Address A.D.A. Box No. 794.

•

IOWA—Dentist wanted for associate in general practice—salary and commission. Address A.D.A. Box No. 795.

•

KANSAS—Dentists returning from service, especially take note. Our office has several inquiries for dentists from Chambers of Commerce and from widows of dentists. Good locations. Address Dr. Gordon L. Teall, Box 71, Hiawatha, Kan.

•

KANSAS—Dentist for 1,500 bed State mental hospital. Modern, fully equipped office on ground floor. Starting salary $7,000 yearly. Raises every 6 months. Under Civil service and Social Security. Apply, Superintendent, Larned State Hospital, Larned, Kan.

•

MISSOURI—Young dentist wanted in southeast Missouri town. To share office with M.D. First 6 months rent free. There is no other dentist in town at present. Write or call Joseph F. Lutkewitte, M.D. St. Mary's, Mo.

•

SOUTH CAROLINA—Ideal building for dental office. Centrally located. Adequate parking. Town of five thousand with no dentist. On grounds with practicing physician who will refer patients. Good income from start. Write Box 545-A, Cayce, S. C., or call Dr. William Ramsey, Columbia, S. C.

•

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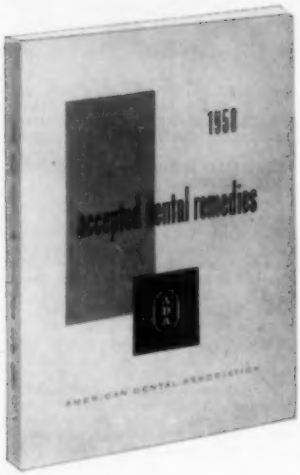

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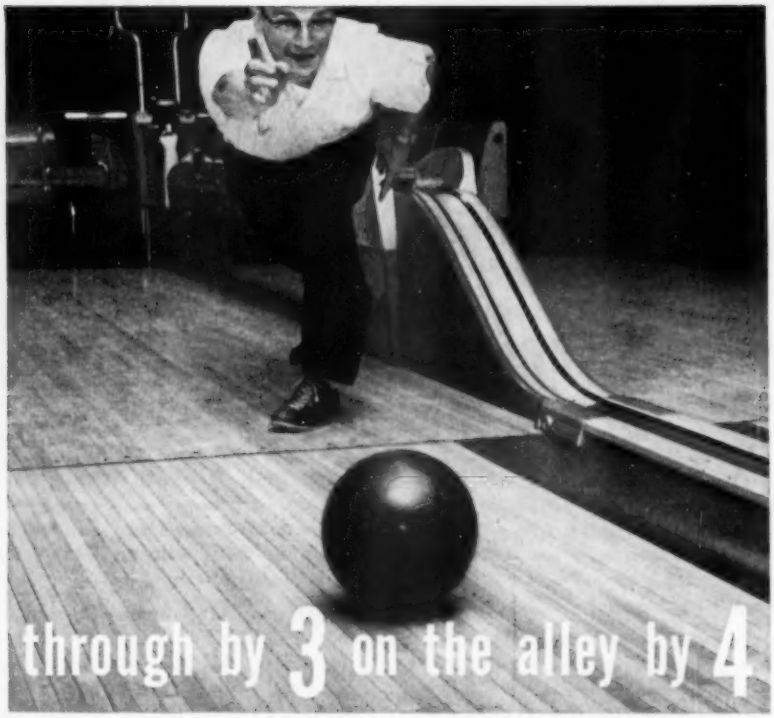

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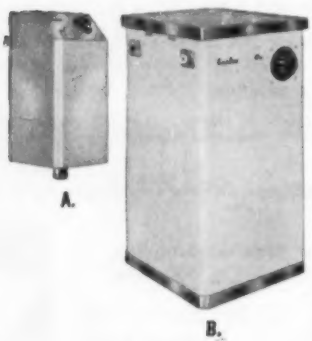

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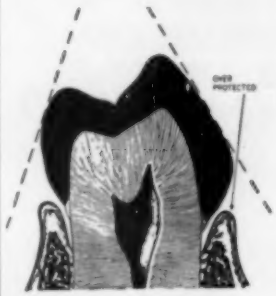

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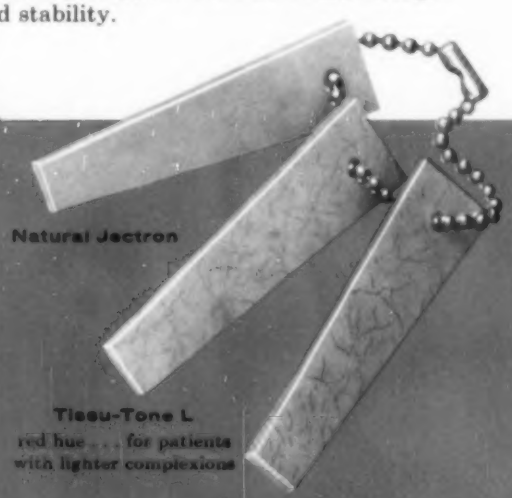
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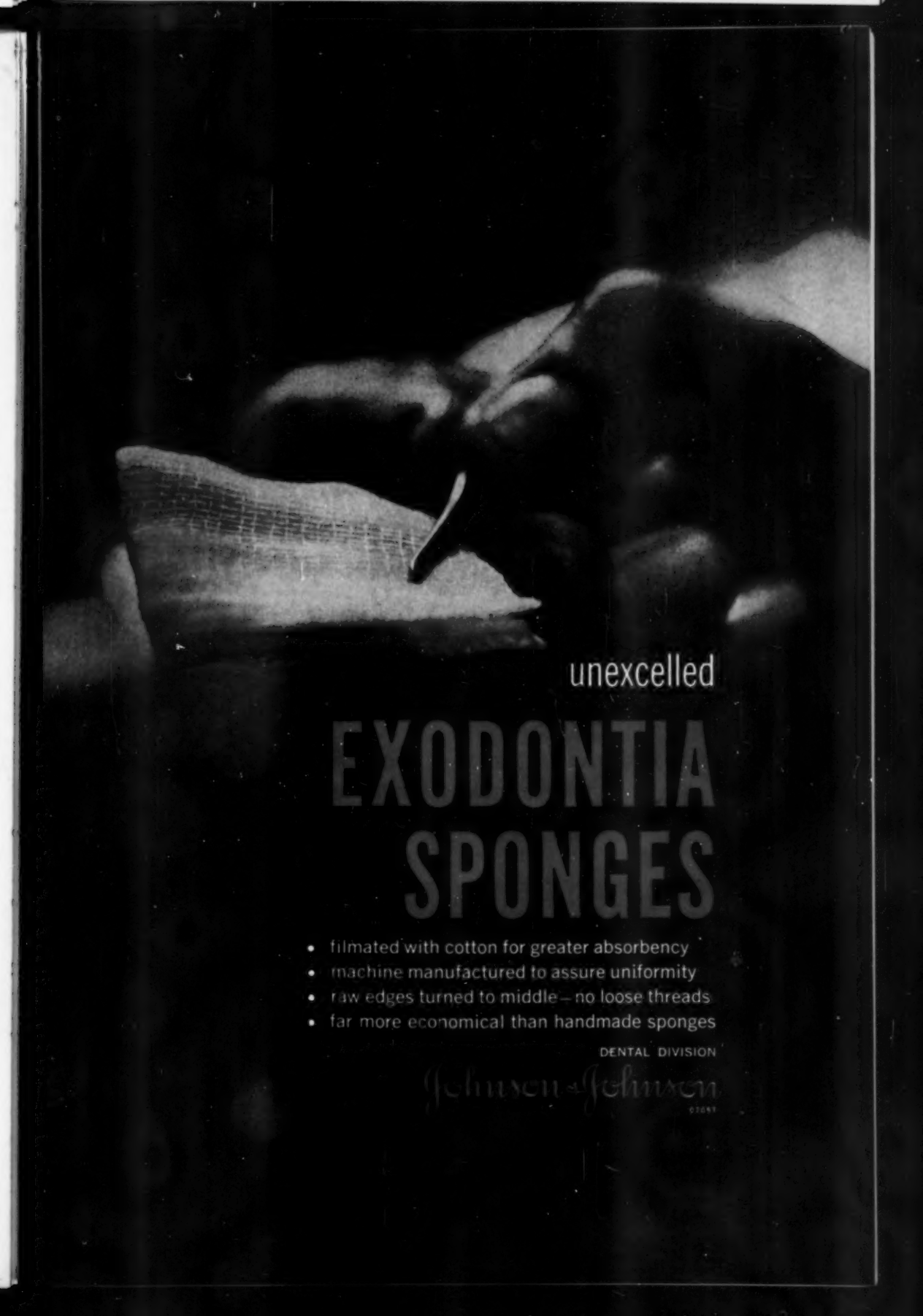
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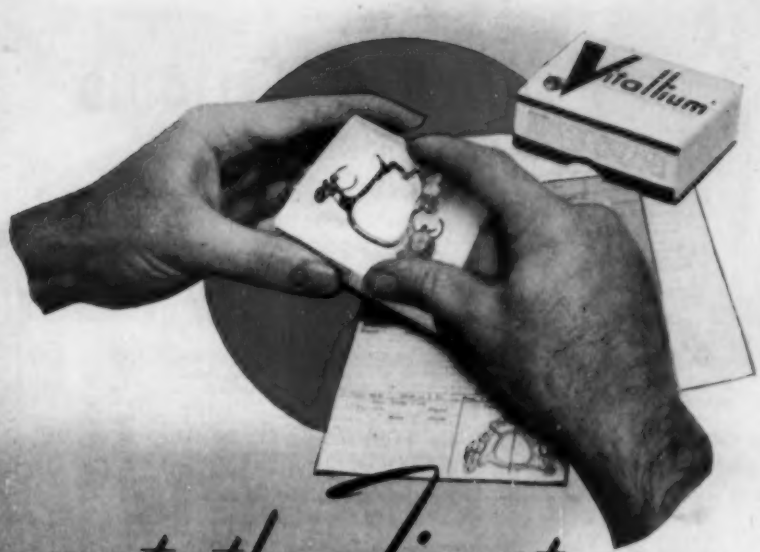

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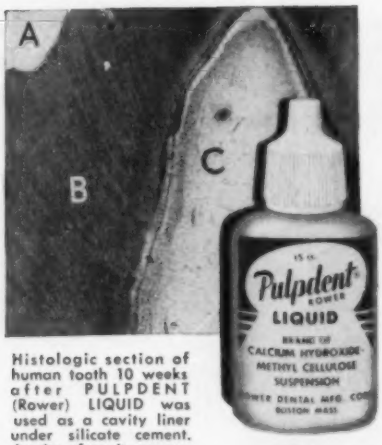

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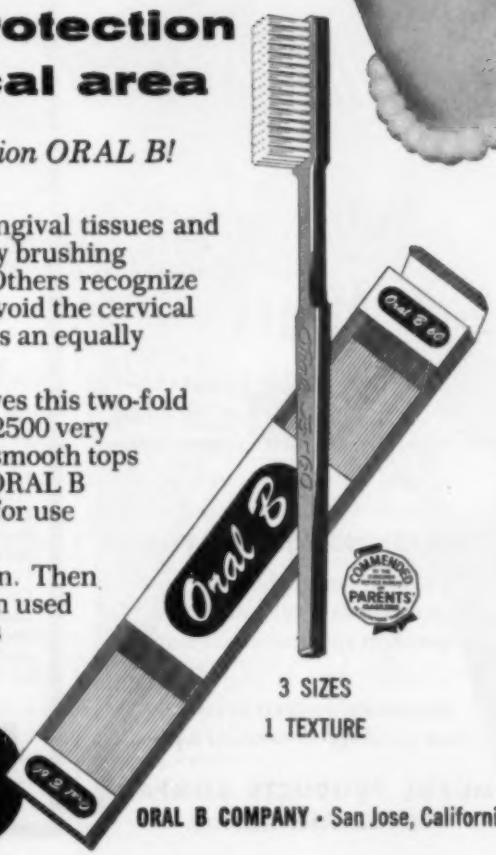

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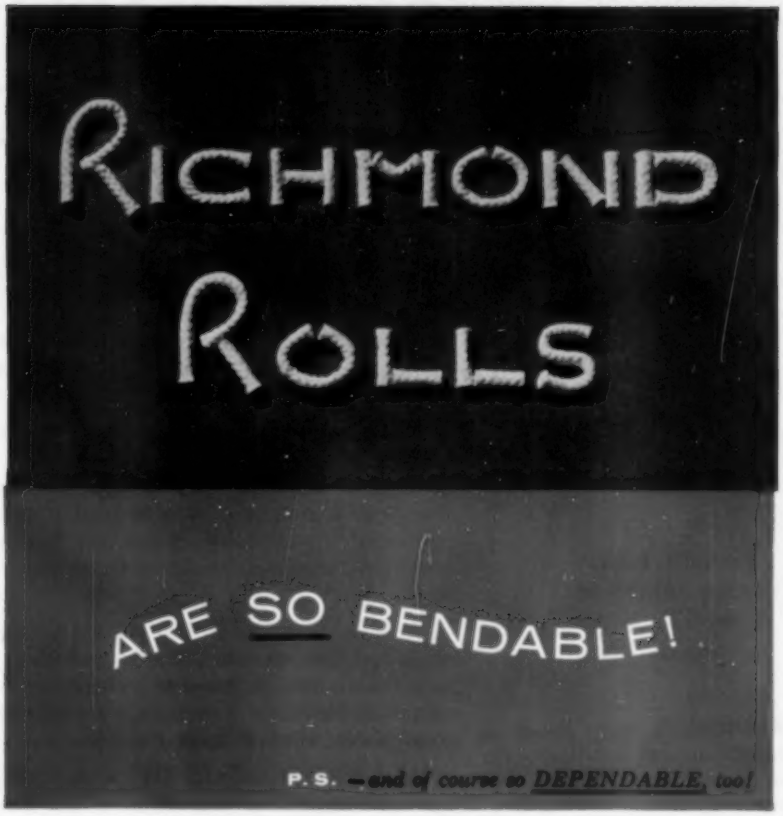

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The division of his day into periods for productive work, for play, and for sleep makes man fare best when his total daily food intake is distributed over three sensibly organized meals.

Since a high percentage of adolescents and adults forego or skimp breakfast, it is well to point out the need for a sensible breakfast: a meal which provides energy for a morning of productive work, which allays hunger until the noon meal, which supplies an adequate share of the day's nutrient requirements, and which consists of inviting, easily digested foods.

A dish of oatmeal helps fulfill the requirements of such a breakfast: It provides readily available energy; it helps to allay hunger throughout the morning; it makes a notable contribution to the day's nutritional needs; it fits into virtually every breakfast, including most of those especially low in calories.*

Oatmeal is richer in protein than other whole-grain breakfast cereals. None are as high in thiamine as oatmeal. Also, oatmeal provides other B-complex vitamins. Its mineral content, especially of iron and phosphorus, rates it among the leaders.

Its delicious taste and easy digestibility further qualify oatmeal as an ideal "habit food" for a sensible breakfast.

Quaker Oats and Mother's Oats, the two brands of oatmeal offered by The Quaker Oats Company, are identical. Both brands are available in the Quick (cooks in one minute) and the Old-Fashioned varieties which are of equal nutrient value.

DENTAL AUTHORITIES stress the importance of optimal nutrition in the aim toward better dental health during the early growth years. Oatmeal, with its wealth of essential nutrients, not only contributes broadly to good nutrition, but—since its carbohydrate is not readily degraded to simple fermentable sugars—is of virtually no cariogenic influence.

***WHEN THE DAY'S CALORIE ALLOWANCE IS**

1400 CALORIES OR LESS PER DAY	2400 CALORIES PER DAY	3000 CALORIES OR MORE PER DAY
Breakfast	**Breakfast**	**Breakfast**
Approximately 300 Calories	**Approximately 500 Calories**	**Approximately 700 Calories**
Orange juice, 4 oz.	Orange juice, 4 oz.	Orange juice, 4 oz.
Oatmeal, 1 oz. Skim milk, 4 oz.	Oatmeal, 1 oz. Milk, 4 oz.	Oatmeal, 1 oz. Milk, 4 oz.
Toast, 1 slice lightly buttered	One egg	Two eggs
†Coffee without cream or sugar	Toast, 2 slices with butter or jelly	Bacon, 2 strips
	†Coffee	Toast, 2 slices with butter or jelly
†For children substitute 4 oz. skim milk		†Coffee

The Quaker Oats Company
CHICAGO

A NEW Book

That Will Help Every Dentist

Render more and better service to more people!

Avoid running a dental practice on a "hit or miss" basis

Dentistry must face the challenge of the future. The growing population, increasing income, better education and a changing labor force, point to an expanding demand for dental services. The expected shortage of dentists demands that better use be made of our present dentists.

You must strive to serve your patients better, but more important, serve more patients. To do this, the non-technical side of dentistry, or administration of your practice, becomes of prime importance to you.

Here is an authoritative look at these challenges and a sensible solution—for your patients, your practice, YOU.

For your free copy, fill in the spaces below, tear out this page and mail TODAY

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Madison, Wisconsin

PROFESSIONAL BUDGET PLAN P-1-58
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NO. 13

DU PONT **DENTAL X-RAY NEWS**

Better Things for Better Living . . . *through Chemistry*

SPLIT-SECOND EXPOSURES

HOW TO AVOID POOR RADIOGRAPHS IN COLD WEATHER

Here are some of the common troubles that crop up in cold weather processing and simple ways to avoid them.

Static electricity is more easily generated when the humidity is low. Swabbing floors with a damp mop will help keep the humidity high enough to help eliminate static. Or, you can buy a darkroom humidifier. Be sure all metal benches or table tops are grounded.

Processing films in cold solutions will not give them the contrast necessary for good clear radiographs. Check solution temperatures carefully . . . try to keep them at a constant 68° F.

Drying films can be a problem in dry air! Low humidity may cause the film to buckle or become brittle when drying. Maintain relative humidity of 20-40% while drying films.

If you do not take these precautions, you may find many of your films spoiled. An interesting collection of dental radiographs, made into a film strip, shows the many things that can go wrong in processing. If you'd like this film strip shown to your group, write Du Pont, 2420-2 Nemours Building, Wilmington 98, Delaware.

with Du Pont Lightning Fast Film

Lightning Fast Film is an extremely high speed periapical film. Its unusual speed permits increased focal distances while keeping exposures short. The split-second exposures possible with this film decrease the amount of radiation to both patient and operator.

Dosimeter film is the best way to record the amount of radiation one gets when working with x-ray. The dentist in the photograph is wearing a dosimeter film badge. More and more people who work with x-ray are using these badges to monitor the amount of radiation they receive.

Du Pont makes many types of dosimeter film that records a wide range of x- and gamma-radiation. For a list of laboratories supplying dosimeter film badge service, write Du Pont, 2420-2 Nemours Building, Wilmington 98, Del.

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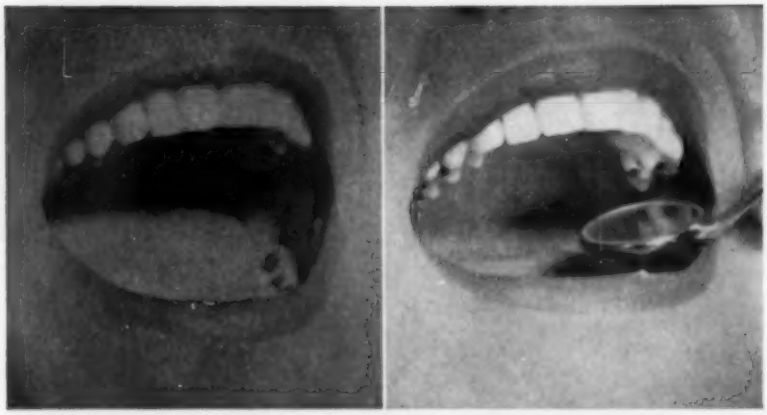
Since the National Casualty Company's plan of accident and health insurance is now in effect in New York, New Jersey, California, Utah and Nevada, the Association Plan is not available in those states.



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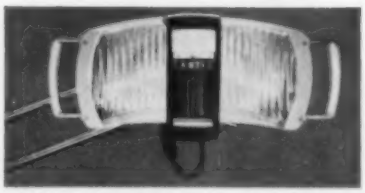
You can see the difference with

PANOVISION "SUNLIGHT"

Ever take a suit to the window to get a better look at the color? You did this because you see color differences best in sunlight.

In dentistry, too, it's important to see colors as they really are. That's why the light you use should closely resemble sunlight. And Castle's PANOVISION Light does! It gives you all the true natural colors of sunlight for better matching, better work.

Ask your Castle salesman to show you this simple test: beam both your present spotlight and a Castle PANOVISION* on orange paper. Under the PANOVISION the paper is a clear, pure orange, but under an ordinary light it's either a dark red or a dusky, gray



tint. That's because only PANOVISION light gives you exact color reproduction—like sunlight does.

Small wonder most dentists prefer PANOVISION. When it comes to color, they can *see* the difference . . . and their work shows it!

See your Castle Dealer or write for free copy of "Vision in Dentistry."

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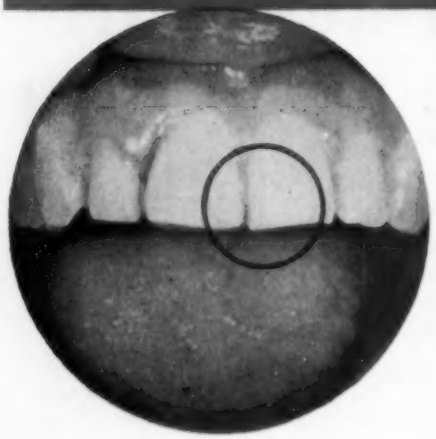
When function disqualifies silicate...

and economics precludes a jacket crown...

KADON
answers the problem!



You can't expect silicate to serve very long in a large tip and corner filling. Often, too, the cost of a jacket crown would be a hardship to the patient. In these cases, Kadon is the material of choice . . . functionally, esthetically, economically!

Placed either by brush or with a Caulk Crown Form, Kadon assures tight adaptation, with minimum discomfort to the patient.

CAULK CAVITY PRIMER
is indicated in all cavities ready for Kadon fillings. Cavity Primer makes dentine and enamel chemically receptive to the resin filling material.

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When presented six years ago, Jeltrate was the *most needed* impression material in dentistry. It remains so today. No other material begins to equal Jeltrate in these important characteristics:

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- long shelf life — powder stays fresh in bulk container

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(Applications should be received by March 1, 1958)

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Council of the National Board of Dental Examiners

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For each calorie of fat from all foods consumed in the United States, there are 0.29 calorie from protein and 1.15 calories from carbohydrate also consumed. For each calorie of fat from all dairy foods consumed in the United States, there are 0.52 calorie from protein and 0.15 calorie from carbohydrate also consumed. For each calorie of fat consumed as whole milk, there are 0.44 calorie from protein and 0.56 calorie from carbohydrate also consumed . . . plus some of all other needed nutrients.

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Fats, as present in foods and as used in meal preparation, contribute to the pleasure of eating . . . and to the nutritional adequacy of the diet.

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The nutritional statements made in this advertisement have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current authoritative medical opinion.

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Referral of patients

is a simple matter

when you use the

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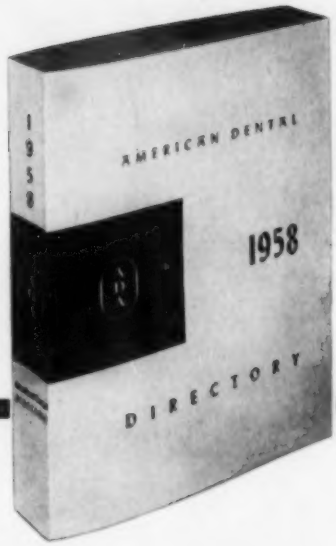

. . . because it lists the names and addresses of over 100,000 dentists both alphabetically and geographically. With complete and up-to-date information on each dentist listed including ADA membership status, age, character of practice, dental school attended, and year of graduation the referral of patients becomes a simple matter. Whatever the locality in the 48 states, territories or possessions, the *American Dental Directory* can supply the desired information about dentists—general practitioners and specialists—quickly and accurately.

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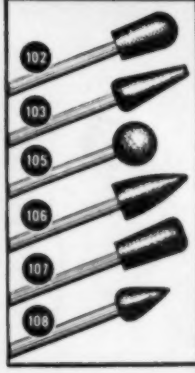

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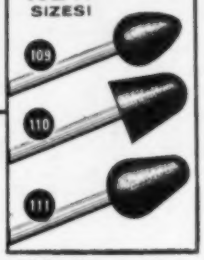

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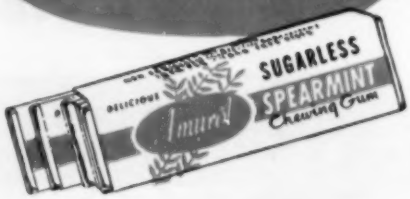

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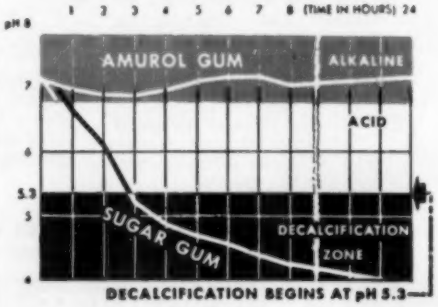

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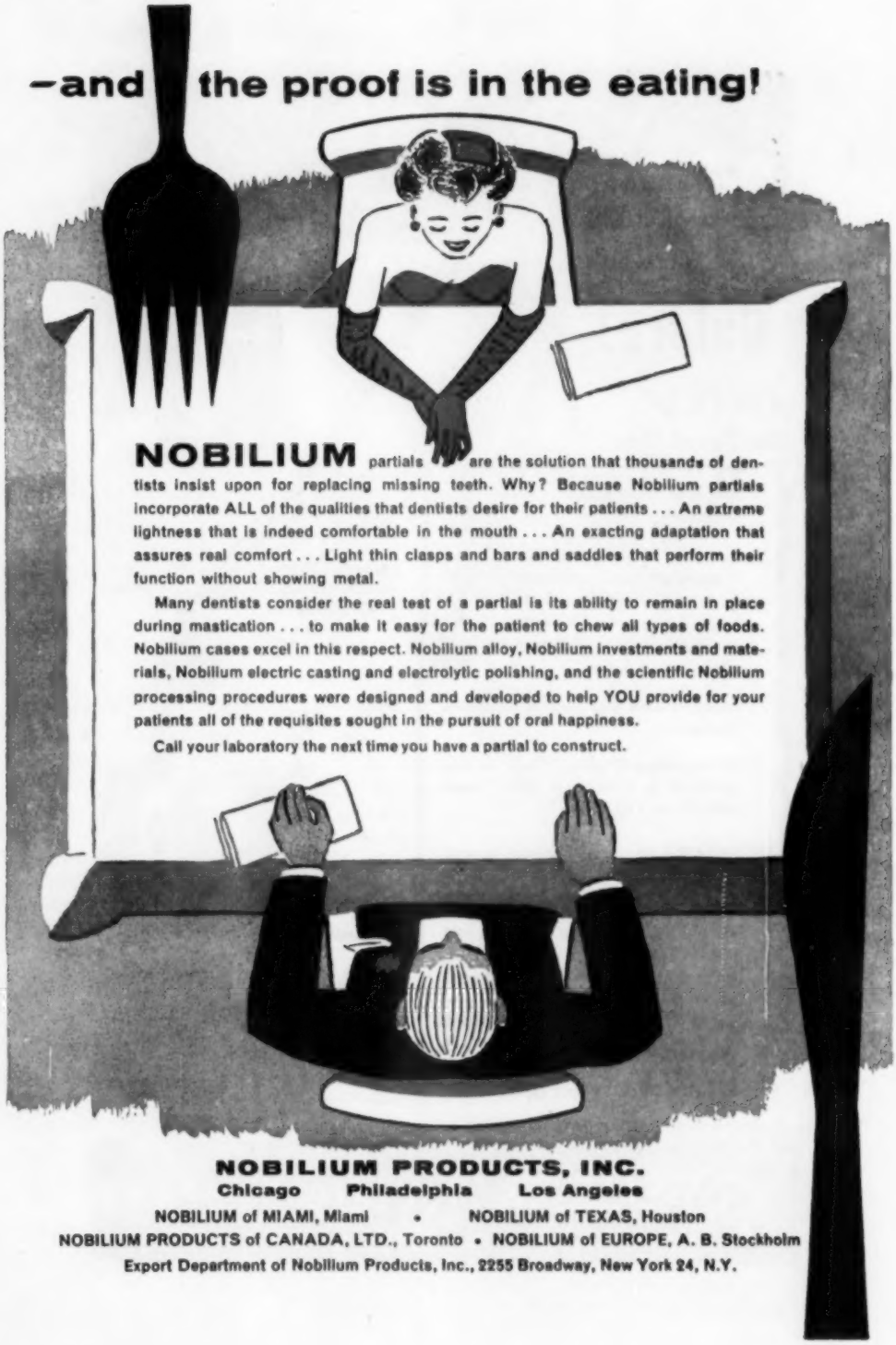

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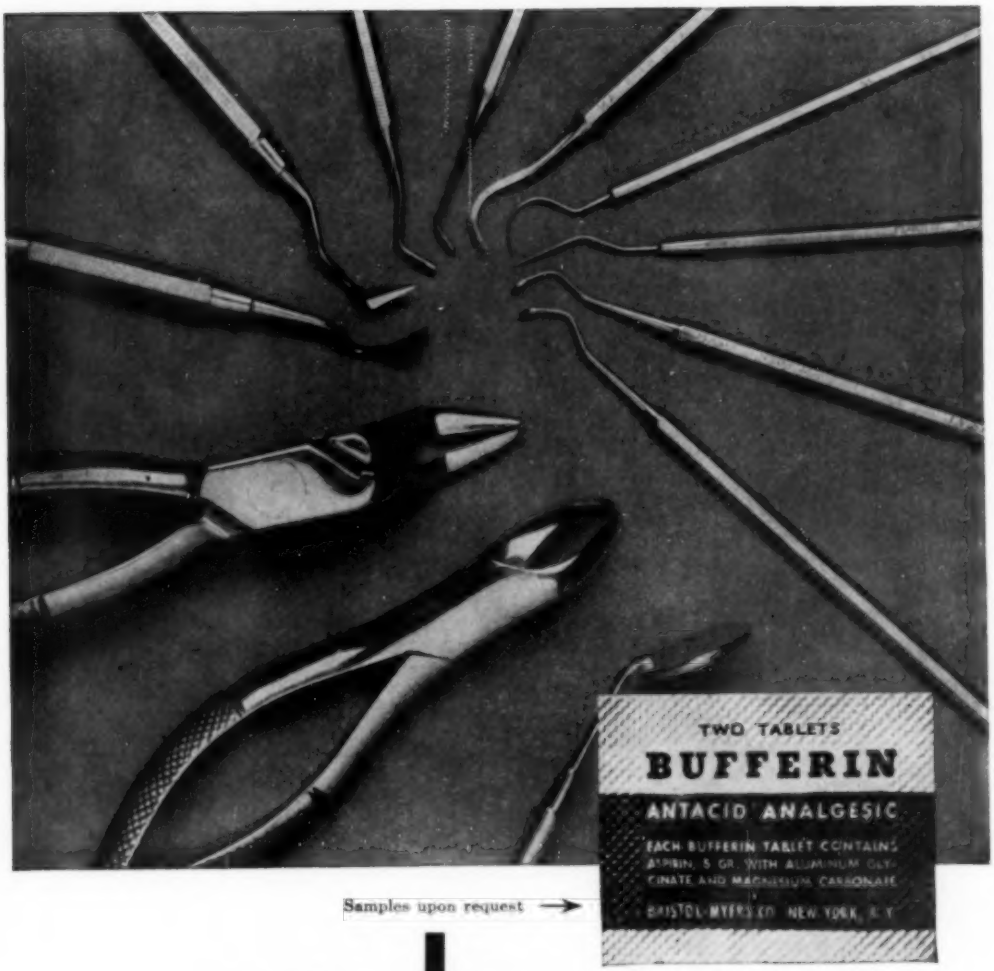

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